



British Guiana.

DIVISIONAL REPORTS
OF THE
DEPARTMENT OF AGRICULTURE,
FOR THE YEAR
1935.

GEORGETOWN, DEMERARA:
PRINTERS TO THE GOVERNMENT OF BRITISH GUIANA.
"THE ARGOSY" COMPANY, LIMITED.

1936.

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M.Sc., Dip. Agr.

Demerara, West—A. A. Abraham.

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Essequibo—E. G. Benson, B.Sc., Dip.
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Agricultural Instructors :

Berbice—E. M. Morgan.

Botanic Gardens—H. A. Cole.

Demerara, East— $\left\{ \begin{array}{l} \text{C. C. Dowding.} \\ \text{W. A. Bovell.} \end{array} \right.$

Essequibo—A. W. Sears.

North West District—L. E. McKinnon.

Agricultural Assistants :

Berbice—H. B. France.

Demerara, East—J. Indrobeharry.

Sugar.

Field Manager (Central Station) :

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RICE GRADING BRANCH.

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G. L. Leitch.

R. R. Ross.

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REPORT ON THE BERBICE DIVISION FOR THE YEAR 1935.

STAFF.

J. D. Gillespie, B. Sc., Agric.—	Agricultural Superintendent.
E. M. Morgan	—Agricultural Instructor, Corentyne.
H. B. France	—Agricultural Assistant, W.C., Berbice.
R. R. Ross	—Rice Grading Examiner, Springlands.

Mr. E. M. Morgan, Agricultural Instructor, left the Colony on August 13 for the United States of America on six months' leave.

GENERAL.

2. This has been a year of the most unusual weather, generally the state of the rainfall as it affected agriculture in the district may be outlined as follows:

There were no rains in December, 1934—January, 1935. When these rains arrived later—February—many rice farmers hurriedly prepared their land and sowed their seed, in the belief that the rains at that time heralded early April-May rains. After these short rains there was a pronounced dry period until May during which time the early sown rice suffered. The mid-year rainfall was normal. The dry latter end of the year enabled enabled rice farmers to harvest their crops under ideal conditions, but adversely affected the growth of cane on the sugar estates.

CROP CONDITIONS.

Sugar.

3. There has been a very good sugar crop this year. Many estates exceeded their crop estimate, and although it was necessary to irrigate more often than is usual, the dry weather during the grinding period facilitated reaping operations. There were in 1935, 23,504 English acres under sugar cane cultivation in this district of which 22,287 English acres were reaped on sugar estates. 74,936 tons sugar were produced from estates' cultivation and 1,027 tons from farmers' canes. The main variety cultivated was D.625. The next most important varieties were Diamond 10 and P.O.J. 2,878 with 2,362 English acres and 1,434 English acres respectively, followed by S.C. 12/4—103 acres, 814/12,—41½ acres, 835/18—24¾ acres and D. 927—13 acres. Of the newer varieties there were 8½ acres of D. 241/21, 6 acres of D. 11/28, 3 acres of D. 66/30 and half an acre of G. 119. Another interesting fact about sugar cane cultivation is that approximately the same percentage of the total acreage under cane in this county is under plants, 1st ratoons and 2nd ratoons. There is only a small per cent. in old ratoons. This practice is now followed, because it has been found to be more profitable to flood fallow and replant after the 2nd ratoon crop, than to retain the fields for further reaping.

Rice.

4. The total acreage under this crop was 32,971 acres yielding an estimate of 511,531 bags (of 140 lb.) padi, an average of 15.5 bags of padi per acre. The yields in the different districts were as follows:—

5. *West Coast Berbice*.—Broadcast (shied). This area was one in which the farmers sowed with the early rains and part of the crop was lost by the succeeding dry period. In some areas it was estimated that there was a loss of 50 per cent. of the plants. When rains eventually fell, re-sowing was carried out and the crop came away fairly well, with the result that yields up to 14 bags per acre were obtained.

6. *Corentyne Coast*.—Transplanted area. The yield in this area was good Farmers obtained crops yielding between 20 bags (of 140 lb.) per acre for ordinary padi and as much as 35 bags (of 140 lb.) per acre where pure line seed was grown

7. *Rice Grading*.—Under the Rice (Export Blending and Grading) Ordinance,

3,900 bags of rice were graded as No. 3 at Springlands stelling during the year. The entire quantity was exported on behalf of Messrs. E. M. Walcott & Co., and shipped to Guadeloupe. No grading was done at New Amsterdam, as most of the rice from this particular area is sent to Georgetown for shipment. It is gratifying to note that both the exporters and farmers are alive to the benefits to be obtained from growing pure line seed. The popular variety at present in the Springlands area is No. 79 which has given excellent yields and makes a very good looking rice, even though badly handled in the factory.

Cacao.

8. Farmers along the Corentyne River areas have been more active in their cacao cultivations this year. The area remains the same, but, in many instances the cultivations have been weeded and cared for and young trees planted to fill up vacancies. There were 151 English acres under cacao cultivation in this district. All the trees are affected with witchbroom disease and yield is, in consequence, poor.

Coconuts.

9. The area returned under this crop for 1935 was 3,660 English acres. There is an increasing interest in this crop as producers are benefitting by the Copra Products (Sale and Manufacture) Ordinance and cultivations are receiving more attention.

Citrus.

10. In the past years (*i.e.* 1929-1935) the following budded citrus plants have been supplied from the Botanic Gardens, Georgetown, and planted in this district:—

Grapefruit.

Marsh	...	...	1,249	
Duncan	...	...	121	
Foster	...	...	8	
Walters	...	...	11	1,389

Oranges.

Enterprise	...	...	1	
Jaffa	...	...	28	
King	...	...	2	
Haags Bosche	...	...	54	
Homosassa	...	...	3	
Late Summer	...	...	45	
Lue Gim Gong	...	...	19	
Majorca	...	...	9	
Navel	...	...	149	
Parson Brown	...	...	88	
P. Apple	...	...	4	
Pomeroon	...	...	48	
Ruby	...	...	37	
Satsuma	...	...	13	
Tangerine	...	...	6	
Valencia	...	...	69	
St. Michael	...	...	27	602

11. *Limes*.—The total acreage under limes in the district was 498 English acres. Of this 452 acres were grown on Plantation Providence, East Bank, Berbice, where 3,138½ gallons of concentrated lime juice and 2,782 lb. of lime oil were produced in 1935. The balance of the lime crop is either used for home consumption or finds its way to the market as fresh limes. The area of about 6 acres of budded grapefruit established during 1931 at Pln. Blairmont is in a good state of

cultivation. The area of 100 budded grapefruit and orange trees planted by the Mayor and Town Council on the New Amsterdam backdam in 1931 is too exposed to visits from citrus pickers and an accurate record of the yields obtained are not possible. The fruits, however, are of good quality. There is now established at Plegt Anker an area containing 900 grapefruit and 400 orange trees which are in good condition and have yielded altogether about 600 fruits in 1935. The oranges are bearing for the first time. The fruits obtained were chiefly disposed of in the New Amsterdam market. When last visited, the trees were heavy with blossom and hopes are high for a good crop in 1936.

Ground Provisions.

12. Under this head comes plantains, cassava, corn, eddoes, etc. The first four named are grown in practically equal amounts, but as they are inter-planted one with another it is almost impossible to get separate crop figures. The areas have been totalled in the census collation and shown in all a total of 3,028 English acres under cultivation. The area under plantains is very much below that required to fill local demands, consequently importations from other districts are very large during certain seasons. The cultivation of the crop is confined to reef lands. Two types of cassava—sweet and bitter—are grown in this district in about equal quantities. A little starch is made for local consumption.

Livestock.

13. *Cattle*.—The total census of cattle in the district shows 41,128 head which is an increase of 3,726 over 1934 figures. This shows that, despite the fairly dry weather experienced, most herds are returning to their normal pre-flood strength. (The returns in 1931 were 48,925 head). The total cattle exports from Berbice were 304 head to Trinidad.

14. The local supply of milk has increased to such an extent that the price in New Amsterdam has fallen to four cents per pint. Very little attention is given to the general management of many herds and in consequence overhead expenses are not high. An outstanding feature is the struggle between ground provision growers and the cattle farmers as regards the responsibility of fencing. The cattle farmers hold that the provision grower should protect his crop while the provision growers maintain that the cattle farmer should fence to prevent his cattle straying from his lands.

15. *Sheep*.—The figures show 19,970 head in 1935, an increase of 1,589 over 1934.

16. *Swine*.—The census for this year shows 10,212 pigs in the district. The increasing number of better bred pig is noticeable but the prices to the farmer are, as in most other commodities not commensurate with the cost of production.

EXPERIMENT STATIONS.

Sub-station Whim.

17. Experiments with the various vegetable crops have been conducted at the Sub-station during the year, and the results are given in the following tables.

TABLE I.
ESCHALLOTS.

Variety.	Date sown.	Date transplanted.	Date reaped.	Area sq. ft.	Yield per plot lb.	Yield per acre lb.
Unknown	... 26.10.34	2.1.35	10.4.35	112	10½	7,000
Unknown	... 26.10.34	2.1.35	10.4.35	300	19	2,755

TABLE II.
ONIONS.

Variety.	Date sown.	Date transplanted.	Date reaped.	Area sq. ft.	Yield per plot lb.	Yield per acre lb.
White	20.11.34	12.1.35	8.5.35	28	17	3,298
Red	20.11.34	12.1.35	8.5.35	28	17	3,298
Red	17.11.34	24.1.35	18.5.35	1,170	261	9,657
White	17.11.34	24.1.35	18.5.35	656	107	7,062

TABLE III.
TOMATOES.

Variety.	Country of Origin.	Date sown.	Date transplanted.	Date reaped.	Area sq. ft.	Yield per plot lb.	Yield per acre lb.
Early Market	England	10. 4.35	16. 5.35	Destroyed	by the	heavy	rains
Marglobe	U.S.A.	10. 4.35	16. 5.35	"	"	"	"
Bonny Best	Canada	10. 4.35	16. 5.35	"	"	"	"
Early Market	England	11.10.34	12.12.34	30.4.35	200	34	759
Marglobe	U.S.A.	11.10.34	12.12.34	30.4.35	200	68	1,410
Bonny Best	Canada	11.10.34	12.12.34	30.4.35	200	2	434
Marglobe	U.S.A.	9. 2.35	23. 3.35	15.6.35	156	82	2,411
Early Market	England	9. 2.35	23. 3.35	15.6.35	156	118	3,197
Bonny Best	Canada	9. 2.35	23. 3.35	15.6.35	156	82	2,411

TABLE IV.
CABBAGE.

Variety.	Country of Origin.	Date sown.	Date transplanted.	Date reaped.	Area sq. ft.	Yield per plot lb.	Yield per acre lb.
Foremost	England	13.12.34	29.1.35	30.3.35	192	73	16,498
Foremost	England	12. 1.35	28.2.35	28.4.35	192	15	3,390
Succession	U.S.A.	22. 3.35	13.5.35	15.7.35	96	Affected by	weather conditions

TABLE V.
BOULANGERS.

Variety.	Date sown.	Date transplanted.	Date reaped.	Area sq. ft.	Yield per plot lb.	Yield per acre lb.
Long Purple	11.10.34	12.12.34	24.5.35	528	272	22,304

Sub-station Macaw.

18. This is a two acre piece of land on the East Bank, Berbice River, which is planted with African Oil Palms. Gros Michel bananas are inter-planted as shade. Since the shade has become established the palms have done fairly well and are putting on height.

DISTRICT WORK.

19. The district has been sub-divided into the following sections:—

1. West Coast, Berbice River—H. B. France, Agricultural Assistant.
2. Corentyne Coast —E. M. Morgan, Agricultural Instructor.
3. Upper Corentyne Coast —R. R. Ross, Rice Grading Examiner.
4. East Bank, Berbice River }
 East and West Canje, }
 Upper Berbice, } J. D. Gillespie, Agricultural Superintendent.
 Upper Canje and }
 Upper Corentyne. }

Mr. Morgan was granted leave of absence as from August 13, 1935, and the assistance of Mr. I. Dewar was obtained during the rice season.

Sugar.

20. The cane trials carried out in Berbice during the year are published in the report of the Cane Agronomist.

21. *Cane Farming.*—There are 97 acres of farmers' canes at the back of Rose Hall Village, Corentyne, and much interest was aroused this year when it was announced that a cup was to be presented to the farmer in the Colony who had done the most for cane farming. The acreages of the various farms were measured,

inspected and reported on, along with the factory results over a period of years. The best cane farmer in Rose Hall was awarded a consolation prize at the Jubilee Agricultural Exhibition held in Georgetown in April. After the canes were taken off a nursery of P.O.J. 2878 and Diamond 10 was planted with ten bags tops of the former and 20 of the latter. These tops were planted on May 4 and will be ready to draw down and extended when the 1936 crop is cut.

Rice.

22. This divides itself into pure line and selected seed padi distribution, the establishment of seed farms, rice growing competition, rice experiments, inspection of rice factories, nurseries and fields, and in the case of the Superintendent and Mr. Ross, rice grading at New Amsterdam and Springlands.

23. *Pure Line Seed Distribution.*—During the year 405 bags (of 140 lb.) of pure line No. 79 seed padi were given out to farmers free on the understanding that sufficient seed should be reserved for sowing in 1936. The amount given out was calculated on the farmer's total acreage.

24. *Pure Line Seed Blocks.*—At Whim Sub-station, $4\frac{1}{2}$ acres of Demerara Creole were grown and gave a yield of 77 bags (of 140 lb.) of pure rogued seed for distribution in 1936. The yield was not satisfactory due to this area being newly taken in for planting experiments. At Pln. Rose Hall, through the courtesy of the Manager, a field of 4 acres was grown with pure line No. 79. From this 87 bags were obtained.

25. *Seed Distribution, other than Pure Line.*—To assist the farmers who lost whole or part of their crop owing to premature sowing, Government purchased for distribution for this district, 300 bags (of 140 lb.) of a high quality Demerara Creole. This assisted the farmers greatly and Government's action was greatly appreciated. Through the co-operation of the District Commissioner, Berbice, a sum of money outstanding from the Flood Relief Fund of 1934 was used to buy 95 bags (of 140 lb.) of Demerara Creole for distribution principally throughout West Coast, Berbice.

26. By means of the continued distribution of high grade seed padi in this district commencing in 1931, the average quality of the padi obtainable throughout the district has improved to approximately 61 per cent. purity on the Corentyne Coast, but is still no more than 30 per cent. on West Coast, Berbice.

27. *Seed Farms.*—Fifty-seven seed farms were established throughout the area, including 10 in New Amsterdam area, 13 on the Corentyne Coast and 34 on Upper Corentyne and Crabwood Creek. All of these seed farms did not, however, qualify for seed certificates. The Crabwood Creek area is very promising and it is hoped that shortly the whole of the area will be in pure line padi. Most of the above seed farmers are satisfied with the variety of seed grown, viz., No. 79, but a few want to return to the Demerara Creole. To meet this, a supply of seed will be obtained from the Experiment Station at Whim.

28. The results of the rice variety trials conducted at Pln. Braham, West Coast, No. 63, Corentyne and Pln. Whim, Corentyne will be published in the Agricultural Journal of British Guiana.

Ground Provisions, Fruit, etc.

29. Inspections have been made and advice and seed of improved varieties given to farmers in various parts of the district. Orders for budded and grafted fruit trees have only been taken after the soil has been inspected in regard to suitability and the farmers instructed in proper planting methods and after-care, *e.g.*, pruning, staking, etc.

AGRICULTURAL EDUCATION.

School Gardens.

30. This is confined principally to the two registered School Gardens. Many

other schools in the district are interested in gardening but it is useless to attempt to start work until proper fencing, irrigation etc., are provided and this requires money.

Auchlyne School Garden.—This garden is situated within the confines of Whim Sub-station. This enables water to be obtained at all seasons, but this advantage does not in any way compensate for the disadvantage of distance, as the boys have to walk quite half a mile from the school. The school garden period is one hour twice a week. Despite the tremendous difficulties several boys were awarded individual prizes in the Education Department's competition and the school garden obtained second prize at the Jubilee Agricultural Exhibition in Georgetown for the best collection of vegetables.

Edinburgh School Garden.—Two boys received individual prizes in the above-mentioned competition, but the school was not able to compete in Georgetown.

Competitions.

31. Two competitions, for growers of pure line seed padi of No. 79 variety, were run in Berbice in 1935, in the Manchester-Liverpool area on the Corentyne Coast and the Crabwood Creek area. Seed for this competition was given free to farmers. The plots were judged on the following points:—

Nursery	...	...	20
Roguing	...	...	20
Yield...	...	...	20
Quality of seed produced	...	...	40
Total			100

The results were as follows:—

(Manchester-Liverpool)

1. G. Sampson, Manchester	...	96%
2. D. Park, Liverpool	...	88%
3. Goberdhan, Letter Kenny	...	85%

(planted at Manchester).

(Crabwood Creek area).

1. Bhagwandas	...	68%
2. Nemnaught	...	65%
3. Harrilall	...	62%
3. Ramoodit	...	62%

} equal.

Co-operative Credit Banks.

32. There are eight of these banks in the district, all of which are under the Chairmanship of the Agricultural Superintendent and the Agricultural Instructor. These banks exist for the purpose of lending money to farmers chiefly for rice growing. The low price of rice has counteracted the effect of a good season and recovery of loans is difficult.

Pests and Diseases.

33. Whenever there is a noticeable dry spell, a widespread attack of some pest or other often follows. This year the following pests have been in evidence:—

Rice.—Leaf-eating caterpillars which attack the rice crop in certain areas. Fortunately, the crop was well advanced and very little damage was done. Also in certain areas the roots of the rice plants were attacked with the rice weevil, but the damage was only severe in isolated cases.

Coconuts.—*Brassolis* leaf caterpillar has been district wide in its attack. Farmers, in some instances, collected and destroyed the nests of the caterpillars and the attack was checked.

Vegetable Crops.—Mole crickets and leaf-eating caterpillars have proved very troublesome to garden crops whilst Coushi Ants are an ever present menace to farmers in the river districts.

34. Very few diseases have been noticed with the exception of those confined to vegetable crops. Tomato Wilt has been prevalent and young plants in the nurseries have been subject to "damping off" disease. The injuries done to plants due to the habit which exists of extending crops by "tearing off" slips and planting these without any attention to the cut surface, etc., all make for the rapid increase of disease.

JUBILEE AGRICULTURAL EXHIBITION.

35. The advertisement, collection, despatch and sale or return of exhibits to and from the Jubilee Agricultural Exhibition held in Georgetown at the end of April, fell entirely on the District Officers. Berbice County was divided into sections, in each of which, with the help of the District Commissioner, Committees were formed by volunteers, who undertook, under the secretaryship of the District Officer concerned, to publish the fact to the farmers and collect the entries and later the exhibits. A large response from the farmers and landowners resulted and it was only through the goodness of the Public Works Department's Executive Engineer that the exhibits from Crabwood Creek and the Corentyne Coast were received in good condition. Along with exhibits from the East Bank, Berbice and the Canje area, the exhibits were sent to Rosignol by special steamer and carefully loaded. Owing to the fact that the entire East Demerara exhibit was loaded on top of these, many were lost or damaged. Nevertheless, several first, second and third prizes were awarded to this county.

J. D. GILLESPIE,
Agricultural Superintendent, Berbice.

March 31, 1936.

DEPARTMENT OF AGRICULTURE.

REPORT ON THE EAST DEMERARA DIVISION FOR THE
YEAR 1935.

11. **CONCLUSIONS**

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REPORT ON THE EAST DEMERARA DIVISION FOR THE YEAR 1935.

STAFF.

E. M. Peterkin	—Agricultural Superintendent.
C. C. Dowding, F.L.S., F.R.H.S.	—Agricultural Instructor, East Coast, District.
W. A. Bovell	—Agricultural Instructor, Mahaica-Mahaicony District.
J. Indrobeharry	—Agricultural Assistant, Experiment Station.

The Agricultural Superintendent was gazetted to act as Deputy Director of Agriculture during the latter's leave of absence from the Colony from May 20 to October 7. He also supervised the Live-stock Division from January 1 to January 18 during the absence in the Rupununi District of the Veterinary Surgeon and from March 1 to July 23 during his absence on leave from the Colony. The Agricultural Superintendent was absent from the Colony on sick leave from November 10 to December 6.

CROP CONDITIONS.

Sugar.

2. The weather throughout the year was suitable for cane growing and the area under this crop is steadily being increased. The labour strikes during the latter part of the year caused the estates to suspend grinding for some weeks. On the resumption of grinding the cane farmers were asked exorbitant prices by the labourers for reaping their canes; this could easily have been overcome by co-operative reaping, but although advised to do so, no effort was made, and the prices asked were in most cases paid.

Rice.

3. The spring crop was negligible. The autumn crop was planted later than usual, but fortunately the rains at the end of the year were not persistent enough to cause serious damage. The crop on the whole was very good.

EXPERIMENT STATION—GEORGETOWN.

Ground Provisions and Vegetables.

4. *Bananas*.—The collection remains as it was listed in the 1933 report. Plots of Gros Michel and Dwarf bananas were planted in April in Section B, South Field; this section was flooded for six months from August 1934 to February 1935. These are making fair growth and some plants are now fruiting.

5. *Plantains*.—The collection remains the same.

6. *Cassava*.—A large number of varieties of sweet and bitter cassava was collected in the East Demerara District some years ago and planted under their local names. This year these have been compared and grouped by the Government Botanist and lists issued to the District Agricultural Officers giving their botanical description and asking that new types be forwarded to Georgetown. In a short time it is hoped that a fairly complete collection will be available as well as a knowledge of the various local names applied to any one variety.

Mangoes.

7. The majority of the mangoes planted in South Field have made satisfactory growth; a few are not doing so well. The collection now consists of the following:—

Julie	...	24	Ceylon	...	1
Mrs. White	...	3	Colonial Bank	...	1
Jamaica No. 11	...	5	Clementi	...	1
Mrs. Dare	...	1	Divine	...	2
Graham	...	2	Peters or Bombay	...	1
Pere Louis	...	3	Lorieau	...	1
Bombay Black (Essequibo)	...	3	Cambodiana	...	2
Peach	...	4	Cherie	...	2
Bangalore	...	1	Gordon (Dominica)	...	2
D'Or	...	2			

The Julie, No. 11, Mrs. White, Mrs. Dare, Graham and Black Bombay fruited during the year.

Tobacco.

8. The demand for tobacco seed still continues. Plots of Kentucky One Sucker, Comstock Spanish, Hickory Pryor and Yellow Mammoth were planted and seed of these is now available for distribution. Seed of "Buck"—a variety collected in the North West District and largely used by the Aboriginal Indians—was sown and a small quantity of seed obtained. A small quantity was sent to the Department of Agriculture, New South Wales, by request.

Green Manures.

9. The *Indigofera endecaphylla* flowered and seeded freely during the year. Seed was collected and given to the Government Veterinary Surgeon for sowing in the cattle paddocks. The southern side of the fruit dam was planted with cuttings and is well established. Large numbers of cuttings have been distributed in the various districts.

10. The "Rice Bean" *Phascolus calcaratus*, grew luxuriantly, was badly attacked by a leaf-eating caterpillar, and flowered freely, but only 30 seeds were obtained from a plot of 8 square-rods; these have been sown in a specially prepared area.

11. Only very small areas of the following are being grown: *Crotalaria spectabilis*, *C. usaramoensis*, *C. juncia*, *C. striata*, *C. quinquefolia*, *C. sp.*, *Indigofera hirsuta*, *I. endecaphylla*, *I. sp.*, *Dolichos hosei*, *Centrosema pubescens*, *Calapagonium mucunoides*, *Pueraria javanica* and *Tephrosia hookeriana*.

Pigeon Peas.

12. Plots of the following varieties were sown in Section C. South Field; these are now fruiting:—Dominica White, Dominica Brown, Barbados White, Barbados Brown, Accibenos, Mites, Hawaii, Silvios White, Silvios Brown, and a white-seeded variety from Mr. Cheesman of the Imperial College, Trinidad, which was received in June and is now flowering. Three varieties, Type 1, Type 3 and E.B. 3 were received from Nagpur Central Provinces, India, in June and were planted in Section C. South Field. These flowered in three months and seed is now being collected.

SUB-STATION CECILIA.

13. The work of this sub-station has been satisfactorily maintained. The number of visitors during the year was 786.

Tomatoes.

14. Plots of the following varieties were sown in October, 1934: Bonny Best, Early Market, Labrador Extra Early Red, Spark's Earliana and Grand Rapids.

15. The results are given in Table I.

TABLE I.

Variety.	Country of Origin.	Date Sworn.	Date Transplanted.	Reaping period.	No. of Stems.	Area Sq. ft.	Yield per Plot lb.	Yield per Acre lb.	Prevalence of Blossom-end rot.	Prevalence of Mosaic.
Early Market ...	England ...	17.10.34	22.11.34	29.1.35 to 2.5.35	2	216	30	6,050	Slight	Very slight
Bonny Best ...	U.S.A. ...	17.10.34	22.11.34	19.1.35 to 2.5.35	2	432	40	4,033	Very slight	do.
Labrador Extra Early Red	Canada ...	17.10.34	22.11.34	19.1.35 to 18.5.35	2	432	42	4,235	Bad	do.
Spark's Earliana	Canada ...	17.10.34	22.11.34	19.1.35 to 2.5.35	2	432	42	4,235	do.	do.
Grand Rapids...	Canada ...	17.10.34	22.11.34	19.1.35 to 2.5.35	2	432	44	4,437	Slight	do.

16. Another trial was carried out with the following varieties which were sown in May; Early Market, Bonny Best and Guernsey Champion. Seed of the last named variety was sent by Major Bone, G.V.S., while in Guernsey.

The results are shown below in Table II.

TABLE II.

Variety.	Country of Origin.	Date Sown.	Date Transplanted.	Reaping Period.	No. of Stems.	Area. Sq. ft.	Yield per Plot. lbs.	Yield per Acre. lbs.	Prevalence of Blossom-end rot.	Prevalence of Mosaic.
Early Market ...	England	17.5.35	22.6.35	14.8.35 to 9.11.35	2	380	36	4,127	nil	slight
Bonny Best ...	Canada	17.5.35	22.6.35	15.8.35 to 9.11.35	2	380	33	3,785	slight	bad
Champion Guernsey.	England	17.5.35	22.6.35	24.8.35 to 9.11.35	2	380	32	3,668	nil	slight

Onions.

17. The following table gives the results of varieties tried out during the year:—

TABLE III.

Variety.	Country of Origin.	Date Sown.	Date Transplanted.	Date Reaped.	Area. Sq. ft.	Yield per Plot lbs.	Yield per Acre. lbs.
White ...	Teneriffe	20.11.34	31.12.34	18.4 to 4.5.35	450	36	3,485
Red ...	"	20.11.34	29.12.34	18.4 to 6.5.35	216	23	4,638
Red Globe ...	Montserrat	20.11.34	27.12.34	18.4 to 4.5.35	105	26	10,786
White Nasik ...	"	20.11.34	28.12.34	18.4 to 2.5.35	301	36	5,210
Red Bombay ...	"	20.11.34	27.12.34	18.4 to 6.5.35	50	16	13,939
St. Vincent ...	St. Vincent	20.11.34	29.12.34	18.4 to 4.5.35	216	65	13,108
Red ...	India	8.2.35	26.3.35	Died out			
White ...	"	9.2.35	27.3.35	Died out			

18. The growth of these plots was much hampered by high winds and dry weather. Bulbs of Red Bombay and Red Madras eschalot-onions from Montserrat and Trinidad respectively have been successfully grown during the year. The following varieties were sown on November 15:—White, Red, Varola's Purple, Crystal White Wax and Yellow Bermuda.

Soya Beans.

19. An area of 518 square feet of White Caracas was sown on December 1, 1934 and reaped on April 9, 1935. This yielded 40 lb. or 3,364 lb. per acre. A plot of 532 square feet of the same variety was sown on May 18, and reaped on September 14. This gave a yield of 38 lb. or 3,111 lb. per acre. This plot was re-sown on September 23 and is making good growth. This variety has been under trial since 1928 and is undoubtedly becoming acclimatised.

The viability of stored seed is improving; the unshelled seed retains its viability for a much longer period than when shelled.

20. The table below gives the results of varieties imported from Canada and tried out during the year. It will be seen therefrom that none of these are as good as the White Caracas.

TABLE IV.

Variety.	Date Sown.	Date Reaped.	Area Sq. ft.	Yield per Plot lb.	Yield per Acre lb.
Manchu ...	18.5.35	3.8.35	126	4	1,383
O.A.C. 211 ...	18.5.35	15.8.35	126	6	2,074
Mandarin ...	18.5.35	3.8.35	133	4	1,310
Wisconsin Black ...	18.5.35	3.8.35	147	4	1,185
Manchu ...	17.8.35	15.11.35	133	2	656
O.A.C. 211 ...	17.8.35	15.11.35	133	4	1,312
Mandarin ...	17.8.35	15.11.35	133	2	656
Wisconsin Black ...	17.8.35	15.11.35	133	2	250

Legumes.

21. In Table V are shown the results of a trial with edible peas and beans. Seed of the first four varieties were obtained from Messrs. Peter Henderson, U.S.A. and Nigeria in 1934 and 1933 respectively while the other varieties were grown from seed obtained locally.

TABLE V.

Variety.	Date Sown.	Date Reaped.	Area. Sq. ft.	Yield per plot. lb.	Yield per acre. lb.
Bush Lima (Henderson) ...	22.11.34	28.1 to 16.5.35	198	8	1,760
Old Homestead Bean (Henderson) ...	"	28.1 to 28.2.35	"	14	330
Bountiful Bush Bean (Henderson) ...	"	"	"	5	110
Lima No. 3 (Nigeria) ...	"	30.1 to 16.5.35	"	94	2,090
Sinebone (Black) ...	"	28.1 to 28.2.35	"	44	990
Sinebone (White) ...	"	"	"	32	770
Variegated Lima Bean ...	26.11.34	7.3 to 4.5.35	"	4	880
White Lima ...	"	8.3 to 4.5.35	"	2	440
Waby Bean ...	"	9.2 to 30.5.35	"	44	990
Yard Bean Short ...	"	4.2 to 16.4.35	"	31	770
Yard Bean Medium ...	"	"	"	24	550
Yard Bean Long ...	"	9.2 to 16.4.35	"	4	110
Bush Bonavist ...	"	11.2 to 4.5.35	"	14	275
Dwarf Bonavist ...	"	9.2 to 4.5.35	"	2	440
Demerara River Bean ...	22.11.34	2.2 to 4.3.35	"	54	1,210
Blackeye Peas ...	"	21.1 to 4.3.35	"	9	1,980
Mung ...	"	21.1 to 4.3.35	"	44	1,045
Urid ...	"	22.1 to 4.3.35	"	24	550

Other Crops.

The Madagascar and Danubin beans from Trinidad mentioned in last year's report failed to produce any fruit and died out.

22. *Sweet Potatoes*.—There has been a constant demand for cuttings of the Black Rock variety.

Chinese Yams.—These were sent to the North West Station for further trial.

Grapes.—A fair crop was obtained, and the vines were pruned in December.

DISTRICT WORK.

Cane Farming.

23. Considerable interest is being evinced in cane farming in the district. At Buxton, farmers are planting provision beds with cane. At Beterverwagting, rice beds are being reconditioned and planted with cane. In a few years there will be very little rice grown in this village—the area is rapidly decreasing. Extension of this crop is being carried out at Plaisance and Golden Grove. During the year the following cuttings were obtained from the Sugar Experiment Station and distributed free:

Plaisance	...	...	13,000 Diamond 10.
Plaisance	...	...	3,250 P.O.J. 2878.
Beterverwagting and Triumph	...	...	9,880 Diamond 10.
Mahaica	...	...	65 Diamond 10.
			26,195

Rice.

24. A steady increase is noticeable in the quality of padi grown. Although large areas of pure line padi were destroyed by the floods of January 1934, a strenuous campaign of pure seed distribution during 1934 and 1935 has resulted in an extension of the pure line acreage. The free distribution of seed padi purchased from the Flood Relief Fund rendered great assistance in this direction. Quantities of seed distributed during 1935 are as under:

Seed grown in Government Blocks...	...	633 bags*
Seed purchased from Flood Relief and Drought Relief Funds	...	525 bags*

Private seed farms have been initiated in order that each estate may have enough pure seed to plant the whole of the estate the next crop. There are two principal difficulties to be overcome:

- (1) No land-owner on the Lower East Coast plants rice himself; the land is rented out and the tenant usually sells his padi to whom he pleases. The officers of this division have approached the various millers and have offered to examine and mark the necessary number of bags required for seed purposes.
- (2) Storage facilities to enable the small farmer to retain sufficient pure seed for his own use in the succeeding crop.

The number of seed farms established in East Demerara was 47. The usual five-acre block of pure line No. 79 was grown at Pln. Nonpareil and yielded 92 bags. This will be distributed in 1936.

A variety trial was laid down at Pln. Hope by the Plant Breeder, the results of which are included in his report.

Plantains.

25. There has been a plentiful supply of this fruit during the year though the bunches on the Lower East Coast show a tendency to decrease in size. The importance of handling the bunches more carefully, particularly those intended for export, has been stressed.

Bananas.

26. The interest aroused last year in growing bananas for export has not abated, and it is difficult to convince farmers that the heavy clay soils of the Coast, coupled with shallow drainage, is unsuited to banana cultivation.

* (1 bag=140 lb.).

Minor Crops.

27. *Ground Provisions*.—There is the usual area under cassava, eddoes and tannias. The Black Rock sweet potato is being grown to a fair extent, but there are no individual large areas other than at Victoria.

28. *Tomatoes*.—The development of tomatoes as a crop is disappointing.

29. *Onions*.—The interest in onion growing has abated, considerable difficulty being experienced in getting farmers to take delivery of seed booked by them. There are a few who grow them regularly and are quite satisfied with their profit. 44 oz. of onion seed, imported from Teneriffe, were distributed to farmers.

30. *Peas and Beans*.—Efforts are being made by farmers to cultivate more peas and beans than hitherto. The varieties most favoured are Lima No. 3, Henderson's Bush Lima and Yard Bean which have given the best results in various trials conducted by the Department. The farmers are willing to grow small plots of Lima No. 3 but are not in favour of extensive cultivations due entirely to the labour entailed in reaping. Farmers prefer a crop, the whole of which can be reaped at the same time. A crop which fruits by degrees over a prolonged period does not appeal to them.

Lodge Allotments.

31. Some of the original holders are still in possession of their plots and appear satisfied with results. Difficulty is still being experienced with the cleaning of irrigation and drainage trenches. Government has decided that all persons in possession of allotments for more than one year are to pay rent at the rate of twenty-four cents per allotment per annum, as from January 1, 1936. Over seventy-five per cent. of the area is beneficially occupied.

School Gardens.

32. It is gratifying to report that the work in the gardens is progressing satisfactorily and attention is being paid to the cultivation of the various crops. St. Paul's school garden, Plaisance, was extended during the period under review. The Buxton garden is to be congratulated on having won most of the prizes at the last Agricultural Exhibition in the school garden section. This school also obtained a certificate for blackeye peas. Vegetable seed obtained from Messrs. Peter Henderson, U.S.A., has been distributed free to the Buxton garden.

AGRICULTURAL EDUCATION.

Competitions.

33. During the year two Rice Farmers' Competitions were held in the East Demerara District, one on the Lower East Coast and the other in the Mahaica-Abary District the conditions in each case being as under :—

For the best block of transplanted pure-line padi, the area to be not less than half-an-acre :

1st. Prize	...	...	\$ 15 00
2nd „	...	...	10 00
3rd „	...	...	5 00

The above prizes were awarded to the three winners in each district when the competitions came to a close in December.

Agricultural Committees.

Meeting of the East Demerara Agriculture Committee were held at the District Commissioner's Office, Enmore, during the year. A number of subjects of agricultural interest were discussed and the proceedings published in the Agricultural Journal of British Guiana.

CROP PESTS.

34. *Sugar Cane*.—Aphis was observed on a few cultivations at Beterverwagting, but little damage was done to the canes.

35. *Rice*.—Birds destroyed large quantities of seed and seedlings in nursery beds during the year, also a large quantity of padi.

36. *Coconuts*.—There were small outbreaks of *Brassolis* at Springhall, Chapman's Grove and Orange Nassau, but little damage was done to the palms on account of the proprietors having collected and destroyed the pest before they could get out of control. Parasite control is being carried out at Springhall.

37. *Plantains and Bananas*.—Beetles are causing considerable damage to the fruit. Not only is a large proportion of the fruit entirely ruined but any bunch attacked is so disfigured as to rendered it unsaleable.

CO-OPERATIVE CREDIT BANKS.

38. The Agricultural Superintendent continued the Chairmanship of the Plaisance-Sparendaam, Beterverwagting-Triumph, Buxton-Friendship and the Georgetown Co-operative Credit Banks during the year. Monthly meetings were held at each bank, and numerous visits had also to be paid to deal with other business.

Mr. C. C. Dowding, Agricultural Instructor, also continued the Chairmanship of the following bank :—Ann's Grove, Golden Grove, and Victoria.

PLANT AND SEED DISTRIBUTION.

39. Plants, cuttings and seeds of field crops distributed from the Georgetown Station and Cecilia Sub-Station are given in the following summary :—

Padi	...	...	...88,620 lb.
Peas and Beans	...	...	... 217 lb.
Legumes (Cover Crops)	...	...	... 16 lb.
Tobacco (seed)	...	...	... 2 lb.
Bananas ...	...	...	... 68 suckers.
Plantains ...	...	...	... 4½ "
Cassava (cuttings)	...	...	... 350
Papaw (seed)	...	...	... 6 oz.
Papaw (seedlings)	...	...	... 464
Onion (seed)	...	...	... 2¾ lb.
Onion (seedlings)	...	...	...37,000
Tomato (seed)	...	...	... 12½ oz.
Tomato (seedlings)	...	...	... 2,800
Tomato (fruit)	...	...	... 2,000
Assorted Vegetable Seed	...	...	... 6 lb.
Coconuts (seedlings)	...	...	... 6
Soya Beans	...	...	... 5 lb.
Sweet Corn	...	...	... 2½ lb.
Grape Vine...	...	...	... 68 plants.
Sweet Potato (cuttings)	...	...	... 6,500
Sweet Potato (tubers)	...	...	... 120 lb.
FODDER PLANTS.			
Demerara Primrose	...	...	... 600 plants.
Guatemala Grass	...	...	... 1,500 cuttings.
Elephant Grass	...	...	... 100 "
Para Grass ...	...	...	... 50 plants.
<i>Indigofera endecaphylla</i>	...	...	... 5,000 cuttings.
<i>Indigofera endecaphylla</i> (seed)	...	...	... 4 oz.

E. M. PETERKIN,
Agricultural Superintendent.

March 15, 1936.

DEPARTMENT OF AGRICULTURE.

REPORT ON THE WEST DEMERARA DIVISION FOR THE YEAR 1935.

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REPORT ON THE WEST DEMERARA DIVISION FOR THE YEAR 1935.

STAFF.

A. A. Abraham—Agricultural Superintendent.

The Agricultural Superintendent who had been in charge of the district since 1934 was confirmed in his appointment as from May 15, 1935.

GENERAL.

2. During the year 1935 weather conditions were remarkably favourable for the cultivation of crops. The rainfall was uniform and evenly distributed throughout the District, and contributed to the extension of the major crops and the reclaiming of the farm lands of the Canals Polder area, which had suffered during the flood period 1933-1934.

3. The planting and reaping of the spring and autumn padi crops were carried out under satisfactory seasonable weather.

4. Regular visits were paid during the year under review to the settlements in the Canals Polder, in order to instruct and encourage the farmers in maintaining the areas under mixed provision crops which were being gradually reclaimed after the flood conditions of 1933-1934.

5. Attendances were also made to meetings of the Agricultural Associations in this centre. At these meetings interesting discussions were conducted with reference to the propagation of plants, citrus culture, proper methods of curing and grading coffee and devising plans for the commencement of an organized export trade in plantains.

6. Periodical visits by the District Agricultural Officer were paid to the sugar estates in the district in connection with sugar-cane experiments carried out during the year by the Cane Agronomist, and with regard to instructional work in padi cultivation to growers on these estates.

8. The fruit crops which received prominent attention by the farming community during the year were bananas, pineapples, citrus and guavas. The trial shipment to England of the Dwarf or Cavendish banana by the s.s. "Ingoma" in August awakened interest in the areas where this variety of banana is grown, but as the shipment was not successful no extension of this crop was made for the year. Budded citrus plants and pineapples have made much progress in the Canals. The pineapples although not of the canning type find ready sales in the local markets. Guavas do not receive much attention although there are a few wild plants.

9. At the Jubilee Agricultural Exhibition held in the Promenade Gardens, Georgetown, on April 25 and 26, this district staged 593 exhibits displayed under 14 sections representative of the agricultural activities of the District; 68 prizes were awarded. It is gratifying to be able to remark that the exhibitors responded whole-heartedly to the endeavours made by the Agricultural Superintendent at meetings held in connection with the exhibition, and during tours undertaken to instruct them in the preparation of the products for exhibition. The exhibition proved of great value to the farming community of the District.

10. In April, the District Commissioner held a meeting of the Chairmen of the Village and Country Districts of West Demerara for the purpose of establishing an organization to be called "The West Demerara Chairmen's Union." The main object of the Union is to afford its members opportunities to discuss matters affecting the district individually as well as collectively and by a mutual interchange of ideas to improve as far as possible the condition of the affairs of the district.

11. The inaugural meeting of the Union was held on July 26, 1935, when an address of welcome was presented to His Excellency the Governor and Lady Northcote.

12. The rules of the Union provide *ex-officio* membership of the Agricultural Superintendent of the District which makes for co-operation between the Union and the Department of Agriculture.

13. Unstable labour conditions experienced during the year did not materially hamper the general routine work of the sugar estates. There was, however, an exodus of black labourers to the mining areas of the Colony during the autumn sugar-cane crop which created a shortage for cane-cutting operations on the West Coast.

CROP CONDITIONS.

Sugar.

14. The area under cultivation on the sugar estates in West Demerara was 16,044 English acres; 13,242 acres were reaped as against 12,361 acres in 1934. The general condition of the cultivation of the sugar estates was excellent. Favourable weather conditions, flood-fallowing and a larger area under Diamond 10, contributed to the satisfactory results of the crop. The area under flood-fallow which comprised 3,462 acres was brought under cultivation in 1935, and planted with Diamond 10, D.625 and P.O.J.2878. At Pln. Wales on the West Bank, the area which was thrown out owing to flood conditions was brought under cultivation this year and made an increase of 1,304 acres over the acreage planted in 1934. At Pln. Uitvlugt on the West Coast, 400 acres abandoned in 1934 were reclaimed.

Rice.

15. There was a favourable planting season for the spring crop and in consequence an early harvest. The reaping of the autumn crop was also carried out under ideal conditions. The acreage under padi for the autumn crop was increased this year by 640 acres. The main factors which influenced the extension of the crop were the uniformity of rainfall, sufficiency of irrigation water and the extended distribution of pure line padi seed provided by the Department. The total area reaped in West Demerara was 10,445 acres with an estimated yield of 18,680 bags (of 140 lb.) as compared with 9,191 acres in 1934 from which 141,892 bags of padi were obtained. The area under pure line padi variety No. 79 during the autumn crop was 1,950 acres and gave an average yield of 39,000 bags of padi of 140 lb. This strain of padi milled a good quality of rice. Unfortunately, shortly after the opening of the milling season the price of rice dropped and in consequence satisfactory sales were not affected. In view of large stocks of rice on hand in November, the mills ceased operations for the remainder of the year.

Coffee.

16. The area under coffee in 1935 was 1,652 acres as compared with 1,554 acres in 1934. Efforts were made during the year on the coffee farms in the Canals centre to replant the areas that suffered loss during the flood period of 1933-1934. The instructions of the District Agricultural Officer have brought about some improvement on certain coffee farms in this section in the preparation of cured coffee. Coffee prices, however, during the year proved no better than in 1934. Prices offered fluctuated between 3 cents to 4½ cents per lb.

Cacao.

17. No extension has been made during 1935 in respect to the cacao industry of this district. Conditions have remained the same as in 1934. The area in cacao at Pln. Middlesex which was brought under cultivation in 1934 was fairly well maintained during the year. Some judicious pruning was carried out and the material burnt. This has had some effect in keeping the spread of "Witchbroom" disease under control.

Citrus and Ground Provisions.

18. During the year increased interest was evinced in the cultivation of budded citrus plants. Apart from plants supplied by local nurseries, budded plants were also obtained from the nurseries of the Botanic Gardens, Georgetown, for further planting. The cultivation of the various budded citrus plants at Plantation Middlesex, Canal No. 2 continued to make satisfactory progress during the year. In July, 50 additional plants of budded Marsh seedless grapefruit were planted out.

19. Much work has been done to re-establish areas under root crops. This was especially noted in regard to cassava, which was made possible by the supply of planting material obtained from the North West District and issued by the District Agricultural Superintendent.

DISTRICT WORK.

Sugar.

20. The Agricultural Superintendent collaborated with the Sugar Experiment Station in connection with the sugar-cane experiments conducted in this district during 1935. The details of these experiments are given in the report of the Cane Agronomist.

Rice.

21. Organised efforts to establish a series of private pure line padi seed farms for the improvement of the padi industry, under a scheme laid down by the Department, had the support of the District Commissioner. The programme was well received by the sugar estates' authorities and the proprietors of the padi estates, who undertook to assist in the supervision of these nurseries. This co-operation helped materially in making the scheme a success. The Department's seed farm was established at Plantation Vreed-en-Hoop. This formed a central site of 10 acres for experimental work. Nine acres of pure line padi No. 79 were grown. One hundred and ninety-six bags (140. lb.) of padi were reaped and stored for extension of private seed farms in 1936. The organisation of these farms was successfully carried out. The inspection of seed reaped by growers for storage in connection with these seed nurseries in 1936 had begun towards the end of the year under review. The following seed was issued during the year :—

	(Bags Distributed 140 lb. each).
Departmental Pure Line Stocks	200 bags.
Selected Seed Purchased	670 " *

22. A variety trial was conducted on one acre of the Department's seed farm during the autumn crop. The results of this trial are given in the report of the Plant Breeder. The Plant Breeder further reports that the "Local" type in this trial consists largely of a long-grained Blue Stick and may be of value when it has been purified by selection.

Citrus.

23. Budding operations continued in the district during the year. Another nursery was established at Plantation Blankenburg in June. At Plantation De Kinderen an additional 400 sour orange seedlings were budded in April with buds of the Marsh seedless grapefruit. In the month of September, budwood of Parson Brown and Valencia oranges was received from Trinidad for operations at this nursery. Budwood from approved local orange trees in the Canals Polder area was obtained for the citrus nursery at the Botanic Gardens. During the year 736 budded seedless Marsh grapefruit were despatched from Plantation De Kinderen nursery for planting at Plantation Coverden, East Bank.

*Includes 270 bags purchased by the District Commissioner but distributed by the Agricultural Superintendent.

Pineapples.

24. The pineapple concessions at Dalgin on the Demerara River were visited periodically in connection with the manurial plot which is under the control of the Department. Further spraying with Ferrous Sulphate was carried out, and an application of Sulphate of Potash at the rate of 11 gms. per plant was given to some plots. Beginning in August a series of shipments of fruit from this area were forwarded for analysis. Full details in connection with these experiments are discussed in the report of the Chemist-Ecologist.

Bananas.

25. The investigation of the status of the Dwarf or Cavendish banana cultivation in this District was undertaken during January. The Dwarf banana is not cultivated at the present time. Where planted in earlier days the stools had been allowed to grow and sucker without control. A careful inspection made of the areas and a census taken revealed that there is sufficient planting material for extension on regular farming lines. Much time was directed to the trial shipment of the Dwarf and Gros Michel bananas to London by the s.s. "Ingoma." A survey was made of all the banana areas with a view to selecting and earmarking, as far as practicable, bunches which would be in the correct stage of development at the time of shipment. This proved somewhat difficult and entailed a good deal of searching in view of the uncultivated condition of the plots. The quantity of bunches required, however, was obtained. Prior to shipment a series of experiments were conducted in cold storage with respect to testing the ripening period for travelling. The results proved problematical. Nevertheless, the trial shipment under the following classification was made :—

Dwarf Bananas :

No. of hands :	5	6	7	8	9	10	11	13	Total.
No. of bunches :	6	34	45	18	12	3	1	1	120

Gros Michel :

No. of bunches :			8	5	11	1			25
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Total	6	34	53	23	23	4	1	1	145
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Onions.

26. Further progress in the cultivation of onions was made during the year. One hundred and six ounces of onion seed imported from Teneriffe were distributed to farmers. This was an increase of twenty ounces as compared with the importation of 1934.

AGRICULTURAL EDUCATION.

School Gardens.

27. The five school gardens established in this Division and reported on in 1934 were well maintained during the period under review. Although only Stewartville school garden is registered and receives a grant from the Agricultural Department, the others, nevertheless, in common, participate in the agricultural instructions given. Assistance is also rendered by the Agricultural Superintendent to the unregistered gardens by the supply of seeds and seedlings. The seeds distributed to these gardens this year included : Tomatoes, Onions, Lettuce, Lettuce-cabbage and Cabbage. The crops grown from these seeds were very satisfactory.

28. These gardens continue to serve a very useful purpose in the scheme of agricultural education in the district. It is satisfactory to be able to report that the pupils of other schools are influenced by the work conducted at these established gardens.

Competitions.

29. *Padi Competition*.—These competitions were conducted under similar conditions as in previous years, but restricted to the private seed farms organized this year for the propagation of pure line seed padi variety 79. These competitions were keenly contested. The entrants were impressed with the value of the competitions for the propagation of pure line seed, as by this means they are enabled to place a good quality rice both on the local markets and abroad. Roguing was a marked feature of these farms to maintain the purity of the variety. At the end of the harvest the final results were as follows :—

Name.	Address.	No. of points.	Awards.
Mohabir Singh	...L'Union	95	\$ 4 00
Bipat	...Rotterdam	95	4 00
Jho Jho	...Windsor Forest	95	4 00
E. Young	...Fellowship	80	2 00
A. O. Willems	...Vergenoegen	80	2 00
Rampersaud	...La Grange	80	2 00
Beepat	...Schoon Ord	75	1 00
Mohammed	...DeKinderen	75	1 00
Panchoo	...Uitvlugt	75	1 00
Mohesh	...Tuscheu	75	1 00

In addition to these prizes, forty-two pure line padi certificates, signed by the Director of Agriculture and the Agricultural Superintendent, were issued.

District Agricultural Committees.

30. The annual meeting of the District Agricultural Committee for West Demerara was held on December 14, at the District Commissioner's Office, Vreed-en-Hoop, under the Chairmanship of the Director of Agriculture. Agricultural matters pertaining to the West Demerara District were discussed and the proceedings will be published in the Agricultural Journal of British Guiana.

CO-OPERATIVE CREDIT BANKS.

31. The activities of the six Co-operative Credit Banks of the District continued to be satisfactory. Meetings were held regularly and the policy in connection with the collection of loans made progress during the year.

INSECT PESTS.

32. A vigorous campaign was made during the year towards the destruction of Coushi Ants' nests with Carbon Bisulphide. These ants are a troublesome pest in some parts of the farming sections of the District. This work made good progress at Good Intent and Sisters Villages, West Bank, Demerara.

A. A. ABRAHAM,
Agricultural Superintendent,
West Demerara.

March 15, 1936.

DEPARTMENT OF AGRICULTURE.

REPORT ON THE ESSEQUEBO DIVISION FOR THE YEAR 1935.

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REPORT ON THE ESSEQUIBO DIVISION FOR THE YEAR 1935.

STAFF.

Hector MacLuskie, U.D.A.	—Agricultural Superintendent.
E. G. Benson, B.Sc., A.I.C.T.A., Dip. Agric.	—Assistant Agricultural Superintendent.
A. W. Sears	—Agricultural Instructor.
A. S. Khan	—Clerk.
N. Ally	—Clerk.

The Agricultural Superintendent returned from leave on January 24 and assumed duties of the Division on February 20, *vice* Mr. A. deK. Frampton, transferred to Malaya.

The Assistant Agricultural Superintendent was temporarily transferred to Headquarters on November 6, and resumed duty on December 27.

GENERAL.

2. The work of the division consists of the administration of the Bush Lot Land Settlement, supervision of the Government estates now leased, and district routine throughout the Coast and the Essequibo Islands. Two crops of rice experiments were grown during the year on the Department's stations at Henrietta, Wakenaam and Leguan. Three Co-operative Credit Banks are supervised by the Superintendent as Chairman. Milling trials were conducted at the rice mill. Four school gardens are in operation, two having been added during the year, voluntarily.

CROP CONDITIONS.

Sugar.

3. Only one sugar estate remains on the Essequibo Coast and recently the entire property was advertised for sale as a going concern. A Commission was appointed in December, 1934, to enquire into the position which would be created on the Essequibo Coast if Hampton Court were abandoned as a sugar estate. The recommendations of the Commission have since been published in Sessional Paper No. 16 of 1935.

Rice.

4. The price of padi remained constant during the year at \$1.20 per bag of 155 lb. or \$1.16 per bag (Government Standard) of 140. lb. gross. In the islands of Wakenaam and Leguan prices were lower, at \$1 to \$1.16 per bag.

5. The quality of padi tended to improve as wider distribution of seed became effective. Estate proprietors evince considerable interest in padi improvement schemes and the demand for seed is greatest for the autumn crop.

6. 'Bull mashing' or threshing with oxen has become fairly general, to the detriment of the manufactured rice. This is a matter of concern amongst rice millers, who, however, look upon the practice with considerable tolerance owing to the present low prices compared with former years, which more or less prohibit the expensive hand threshing method. 'Bull mashing' has also resulted in considerable interest being evinced by proprietors in mechanical threshers. Weather conditions for the small crop were damp in the later stage, but ideal for the autumn crop. Towards the end of the year shipping of rice became a matter of some difficulty owing to importations on the West Indian market from the East. In order to comply with West Indian demands for a long grained rice of the Seta Patna type, there is a move amongst millers to experiment with long grained padi. Should the trials being conducted by them in their factories prove satisfactory, there

is a likelihood of a change over from Blue Stick padi, for which variety of padi Essequibo has become famous.

7. The acreage under padi showed a slight increase throughout and estimates for the autumn crop were as follows:—

Leguan	...	...	2,097 acres.
Wakenaam		...	2,847 „
Coast	...	...	6,454 „

The acreage and quality of the small spring crop varied considerably due to the fact that in certain areas, notably the lower Essequibo Coast, dropped seed is allowed to germinate and grow to produce the "Lameira" crop. Yields of padi range around 10 to 12 bags (of 140 lb.) per acre in the spring and 18 to 20 bags (of 140 lb.) in the autumn crops respectively. Yields, are, however, on the downward grade. Complaints of this are heard generally. The limiting production to one crop per annum as a solution is obvious on the face of it, but if only one crop were grown the problem would be finding something for the people to do meantime. Another complaint commonly heard is that steers are too heavy for ploughing the soft land. The fact is that with two crops the landing is gradually getting more waterlogged as there is no chance at all for the land to dry out.

Coffee.

8. Coffee is confined to the Pomeroon. The 1934 floods affected the coffee plantations so badly that they have not yet recovered. Some replanting was carried out but this is not yet in bearing.

Coconuts.

9. The acreage under this crop was returned at 4,677 acres. No increases have been noted during the year. Indeed, proprietors find it difficult enough to maintain the cultivations they possess and most of the plantations are in a poor state owing to the growth of underbush. If the areas could be kept up to the mark returns would be appreciably higher, and during my visits of inspection where improvements could be economically carried out these have been stressed.

10. The Superintendent has been informed that long term loans at easy rates of interest would be a boon to coconut growers, especially if the December price levels for copra (\$56 per ton) continue. The Copra Ordinance should assist in maintaining these price levels. Prices of nuts vary considerably but they tended to rise towards the end of the year. Prices were \$4 to \$6 (unselected) per thousand. The question of grading is one which might be undertaken more widely since \$10 per thousand is offered for selects in Georgetown. Coconut oil is mainly manufactured in small and primitive mills and, at several such mills in Wakenaam, prices range up to 56 cents per gallon.

11. Several trees in the Pomeroon District were reported to have suffered from Wilt and it is considered that the trouble is an aftermath of the floods.

Ground Provisions and Fruit.

12. The chief growing areas for these crops are in the Pomeroon River and to a lesser extent in Leguan, where vegetables are also grown for the West Coast, Demerara, and Georgetown markets. Generally speaking, returns in cash are poor. In plantation production particularly, it is thought something might be done to improve marketing conditions by an arrangement between the growers (and their agents) to ship to Georgetown for export, as the East Coast farmers do. The difficulty appears to be a question of time tables and coast craft connecting with ocean going transport in Georgetown. There is little fruit in the district and that mainly in the Pomeroon area. The outstanding crops are citrus and to a less extent, pineapples from the Lakes.

EXPERIMENT STATIONS.

13. There are three experiment stations situated at Henrietta (10 acres), Wakenaam (5 acres) and Leguan (5 acres) where two crops of rice were grown. The work of these stations was carried out in collaboration with the Plant Breeder.

Henrietta Station.

14. The station is devoted to growing padi seed for distribution and to experiments. The total yield of the station was 355 bags (140 lb. each). Single head selection, the progeny of the previous crop selections, were grown in both crops. In the autumn crop the outstanding progeny row selections were placed in a strain trial to determine which strain should be retained for distribution on the Coast for seed purposes. The strain selected was No. 3 which was a week earlier in ripening and did not show any material difference in yield. This work was confined entirely to Blue Stick.

15. The graded seed trial gave the following results :—

TABLE I.
YIELD TRIAL WITH GRADED SEED.

Grade.	Description.	Padi lb. per acre.
No. 1 ...	Large seed from previous large seed ...	2,661
No. 2 ...	Medium seed from previous large seed ...	2,666
No. 3 ...	Small seed from previous large seed ...	2,634
No. 3 ...	Small seed from previous small seed ...	2,664
D. ...	Control—unseparated seed from previous control plots ...	2,599

There were no significant differences in yield.

16. The selected trial with Blue Stick seed gave the following results :—

TABLE II.
SELECTED TRIAL WITH BLUE STICK.

Description.	Padi lb. per acre.
Single Head selections ...	3,100
Ordinary seed ...	2,958
Selected Seed from Georgetown Station ...	2,665

Single head selections in mass gave significantly higher yields.

17. The strain trial conducted during the autumn crop gave the following results :—

TABLE III.
STRAIN TRIAL—2 LATIN SQUARES 5 X 5.

Description.	Padi lb. per acre.
Strain 2 ...	2,861
Ordinary Seed ...	2,725
Strain 4 ...	2,722
Strain 1 ...	2,717
Strain 3 ...	2,583

There were no significant differences between the first four but strain 3 matured earlier than the rest.

18. The results of the following experiments, which were conducted during the autumn crop, will be published in the Agricultural Journal of British Guiana :— Spacing experiment with Blue Stick—Two 5 x 5 Latin Squares ; Optimum age of seedlings at transplanting—variety Blue Stick ; Variety trial—one 8 x 8 Latin Square.

Wakenaam Experiment Station.

19. This station is chiefly devoted to the propagation of seed of Blue Stick for distribution purposes. During the year there were stored from the spring crop 67 bags (140 lb.) and from the autumn crop 99 bags (140 lb.). A variety trial laid out in an 8 x 8 Latin Square was conducted with five varieties from the Experiment Station, Georgetown, and three local selections; the results will be published in the Agricultural Journal of British Guiana.

Leguan Experiment Station.

20. This station is entirely devoted to growing seed for distribution to local farmers and during the spring and autumn crops 39 and 130 bags (of 140 lb. each) were stored respectively.

Sand Reef, Anna Regina.

21. The area of this station is 5 acres and planted with bananas. The yield has been disappointing. A collection of pineapple suckers was planted in this area but later were shipped in baskets to Georgetown. *Indigofera endecaphylla* was successfully established in part of the area as a cover crop.

DISTRICT WORK.

Seed Padi Distribution.

22. This is done in two ways. First, the seed is grown at the Department's stations at Henrietta, Wakenaam and Leguan and distributed to proprietors. Secondly, proprietors propagate their own supplies on private seed farms, the resulting crop being distributed locally amongst the tenants. The system works fairly well but there is a regrettable tendency amongst proprietors to confine their activities to the autumn crop when, for continuity of policy, it is desirable that both crops should be exploited.

23. The number of seed farms established is as under :—

Coast	...	...	33
Wakenaam	...	...	15
Leguan	...	...	20

Pure seed certificates were issued to thirty-four persons.

For the autumn crop seed was distributed free as a Flood Relief measure, seed for seed farms was also issued free, whilst those requiring additional supplies bought. The following table shows seed distribution for the year :—

SEED PADI DISTRIBUTION—1935.

NO. OF BAGS (140 lb.) DISTRIBUTED.

				Pure line seed Departmental Stocks.	Selected Seed Purchased.
				bags.	bags.
Henrietta	...	...	...	190	120
Wakenaam	...	...	...	67	...
Leguan	...	...	...	39	...
Bush Lot	...	...	...	...	166
Total	...	...	...	296	286

Rice Grading.

24. Following the customary practice, all rice shipments are examined at the factories on the coast on behalf of the Rice Grading Officer in Georgetown. The following shipments were passed :—

Super	...	...	12,610 bags.
Extra No. 1	...	...	7,493 „
No. 1	...	...	720 „
Super Broken	...	...	10 „

AGRICULTURAL EDUCATION.

School Gardens.

25. Two school gardens situated at Sans Souci, Wakenaam, and Suddie, Esse-quiibo Coast, were in operation. Subsequently two more, one at Huis't Dieren and the other at Hampton Court, were added. Supplies of vegetable seed were distributed and officers of the Department visited from time to time. Only two schools are fully equipped with tools. The Sans Souci garden is partly run as a demonstration plot, and if funds permitted, more such plots could be started.

Jubilee Agricultural Exhibition.

26. It is a pleasure to record the support accorded to, and the success obtained by local agriculturists at the Jubilee Agricultural Exhibition held at Georgetown. These, in many instances, lived at remote distances in the district. Free transport facilities were given to Georgetown and exhibits were either sold on behalf of, or returned to, exhibitors. The following is a summary of awards gained:—

District,	1st.	2nd.	3rd.	Totals.
Pomeroon	5	5	4	14
Coast	11	6	2	18
Islands	3	3	3	9
	19	13	9	41

The total prize money amounted to \$69.25. In addition, a Diploma of Merit was awarded to Messrs. Rashbaharry of Johanna Cecilia for their "Super export rice" exhibit.

CO-OPERATIVE CREDIT BANKS.

27. There are three co-operative credit banks in the District, situated at Anna Regina, Onderneeming and Wakenaam Island. The last named bank does limited lending owing to the large amounts which are outstanding. The other two banks are on a firm footing and declared dividends of 6 and 3½% respectively. The Superintendent is Chairman of the banks and meetings are held monthly.

ANNA REGINA ESTATES.

28. These embrace Anna Regina, Henrietta, Richmond and La Belle Alliance and comprise 3,346 acres. They are leased for three years (1934-36) to Mr. Parikhan Rai of La Union. Due to the leasing of these estates, hitherto under the Department's control, and with the resulting loss of control upon the tenants, it was decided to dispose of their debts by sale. The lessee was the purchaser. The upkeep of the estates for the year was fair. Two drainage channels serve the estates, which at one time or another were blocked by sling mud which is washed in by the sea. During the autumn crop about 750 acres were planted with rice which is an increase on previous crops within the tenancy.

BUSH LOT LAND SETTLEMENT.

29. The following comparative table summarises the population and the total indebtedness of settlers at the end of 1934 and 1935.

INDEBTEDNESS.

Date.	Acres.	Popula- tion.	House rent.	Land rent.	Sanitary fees.	Interest.	Adv.	Total.
December, 1934 ...	184 1	205 1.1	72.73 .39	207.93 1.13	10.50 .06	28.30 .15	\$1,443.70 7.90	\$1,768.16 9.63
December, 1935 ...	240 1	214 .9	34.67 .14	304.79 1.27	1.50 .07	41.59 .17	1,611.45* 6.70	1,994.00 8.28
Difference	...	- .2	- .25	+ .14	- .053	+ .02	- 1.20	- 1.35

* Of this sum \$205 represents ploughing steers purchased.

Although the actual amount of debt is \$225.84 more at the end of 1935 than it was at the end of 1934, it must be remembered that in 1934 one rent for house and land was charged, whereas in the current year two rents were collectible. Moreover, the acreage planted in the autumn crop of the current year was 240 against 184 in 1934. Consequently, it will be noted, that at the end of 1935 the total outstanding debt per acre planted in the autumn crop shows a decreased difference of \$1.35, which is 14% of the corresponding figure at the end of 1934.

30. During the year one settler was dismissed and one died. Health conditions remained normal. Chief ailments were Malaria and Bronchitis. Settlers received treatment free from the Anna Regina Dispensary.

31. Two crops of rice were grown. The spring crop was poor and much padi was spoiled by the weather, thus hampering rent collection, but the autumn crop was a good one. Both crops were sold on behalf of the tenants at \$1.20 and \$1.24 respectively, the lessee of the Government estates being the purchaser in each case. Payment was made to tenants on behalf of the purchaser through the Department.

32. The following maintenance works were carried out :—

- (a) All drainage and irrigation trenches cleaned thrice.
- (b) Two check sluices were repaired.
- (c) Two bridges were repaired.
- (d) Three punts were caulked.
- (e) Ten latrines were rebuilt and all houses repaired.
- (f) One mile of road was remetalled with burnt earth.

33. A matter which gives considerable trouble is that of pasturage for the settler's stock. Arrangements are in hand to remedy this matter during the coming year.

MISCELLANEOUS.

Rice Factory—Milling Trials.

34. Machinery trials were conducted in May in collaboration with the Hon. S. H. Seymour. Firstly, a non-stop milling test was made with 110 bags padi (each 143 lb.) which lasted 8 hours and 20 minutes. Fuel consumed—9 gallons crude oil and 8 pints lubricating oil—Power unit 30 H.P. Petter. The recovery totalled 52 bags (each 180 lb.) and 57 lb. Extra No. 1 rice, equivalent to 62%. Secondly, 30 bags (each 143 lb.) were milled with a recovery of 13 bags (each 180 lb.) and 124 lb. super rice and 95 lb. broken rice equivalent to 59.6%. Samples of this rice, together with cone meal, were sent to the Jubilee Agricultural Exhibition in Georgetown. The milling plant consists of a complete unit by Douglas and Grant of Kirkaldy and the padi was parboiled prior to milling. Further trials were impossible owing to the bursting of the boiler, which is a very old sugar estate one. Funds were not available for repairs.

Leguan Milk and Poultry Association.

35. The affairs of this organisation were investigated and reported upon. Despite the fact that membership involves a subscription of only four cents per month, the Association does not function. Members ship their milk absolutely independently.

Dartmouth—Better Success Area.

36. This area was inspected up to the second depth and a report of the assessment of the possibilities for development was submitted. The area is sparsely populated, cultivation is limited and is devoid of drainage. The area (unless drained) cannot be seriously considered for development.

37. A survey of the area round Garraway Stream, Potaro River was carried out by the Superintendent in February prior to his assuming the duties of this Division. A report with soil samples were submitted.

Visitors.

38. His Excellency the Governor, accompanied by his A.D.C. and the Director of Agriculture and the District Commissioner, visited the settlement and factory in July, 1935. Members of the Essequibo Coast Commission visited the settlement and factory in March, 1935. Visits of inspection were also paid by the Deputy Director; whilst the Government Veterinary Surgeon, Plant Breeder and Botanist visited the district on one occasion each.

Reports.

39. The following more important reports were submitted:—Monthly and Quarterly Reports, Area Dartmouth—Better Success, Report of collection of Flood Relief and Emergency Loans, Leguan Milk and Poultry Association, Report on Garraway Stream, Outstanding Indebtedness of Settlers.

40. The Agricultural Returns were compiled and 644 items of correspondence were received and 567 despatched.

Acknowledgement.

41. It is a pleasure to record the loyal co-operation of the Staff during the year.

H. MACLUSKIE,
Agricultural Superintendent,
Essequibo.

March 1, 1936.

DEPARTMENT OF AGRICULTURE.

REPORT ON THE NORTH WEST DISTRICT FOR THE YEAR 1935.

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REPORT ON THE NORTH WEST DISTRICT FOR THE YEAR 1935.

STAFF.

L. E. McKinnon—Agricultural Instructor.

GENERAL.

The weather during the year was satisfactory for all crops. The total rainfall for each month was as follows:—

January	...	2.61	July	...	12.50
February	...	5.88	August	...	8.95
March	...	6.41	September	...	7.68
April	...	1.89	October	...	7.58
May	...	8.50	November	...	10.87
June	...	13.02	December	...	5.98
		38.31			52.96

Total for the year 91 inches 27 parts.

2. It is to be regretted that a number of the farmers in the district suffered considerable financial embarrassment owing to the low prices prevailing for their produce.

3. The clearing house for the sale of farmers' produce was re-organised during the year, and a new Supervisor appointed.

4. Owing to the low price of coffee, which is the only permanent crop suitable to the pegasse soil, many grants in the Barima district have been neglected and allowed to become overgrown with bush.

5. The labour supply is still very limited, which is a handicap to the large grant holders who are compelled to employ labourers to carry on their work satisfactorily.

6. The Agricultural Instructor travelled to Georgetown on April 16 with farmers' exhibits and attended the Jubilee Agricultural Exhibition.

7. Visits were paid to all the farms including those in the outlying districts. The total mileage travelled by boat was 3,000.

8. Farmers are becoming more interested in the citrus cultivation at Hosororo, and are impressed by the crop now that the trees are in full bearing.

9. The two lads who were taken on to learn budding and general nursery work have made very good progress.

10. An apprentice from the Botanic Gardens was sent up to the district on November 27 for two weeks to gain an insight into the general conditions of farming in this district.

CROP CONDITIONS.

Coffee.

11. The acreage under coffee is 1,999 acres, a decrease of 201 acres since the previous year. In some cases land has had to be abandoned owing to lack of money to employ labour, in others, the farms have been deserted and their owners have sought employment elsewhere, especially in the gold fields. In cases, however, where the area cultivated has been reduced to a size manageable by the farmer and

his family without outside assistance, the abandonment of the surplus area may be regarded as a beneficial step.

Citrus.

12. The area under citrus has increased by 5 acres. The budded plants supplied to farmers with a few exceptions continue to make satisfactory growth. The grapefruit and orange plants at Wanaima have borne a fair crop. The fruit is shipped fortnightly in small quantities to the Georgetown market.

13. A private citrus nursery has been established at Arukamai where budding is carried out to suit the owner's requirements.

Limes.

14. The lime cultivation at Hotakwai has been abandoned as well as an area owner by a farmer in the Aruka. The proprietor of the lime factory at Mabaruma continues to buy limes from Hosororo and from the farmers, but the crop was a short one. The output of raw lime juice from the Mabaruma factory was 16,000 gallons and of oil of limes 90 gallons. Shortage of labour again proved a handicap during the year.

15. The budded limes planted on the pegasse land beside the road to Barima stelling have begun to bear.

Cacao.

16. Farmers who have available lands suitable for planting this crop continue to extend their areas, as the price is encouraging.

Ginger.

17. Farmers are becoming very interested in this crop and on many of the farms small plots are to be seen growing, with a view to subsequent extension.

Ground Provisions.

18. No extension of the area under ground provisions took place this year, but the existing cultivation was well maintained. There are no more available lands within easy reach in the Barima district. Excellent crops of tannias and yams were reaped in the Aruka and Koriabo districts during the year.

19. Seven varieties of yams were sent up for trial on pegasse in this district, namely :—Bottle Neck Lisbon, Horne, Guinea Yam, Chinese Yam, Ebu, Ordinary Lisbon and Yellow Yam. They made fair growth at the outset.

HOSORORO EXPERIMENT STATION.

General.

20. The station was well maintained during the year, the citrus orchard proving to be the chief attraction to visitors. The visitors to the station included the Government Botanist, the District Commissioner and Mr. A. A. Bannister, Assistant Inspector of Schools.

Citrus.

21. The area under budded citrus was well maintained and the older trees bore a good crop.

22. 147 grapefruit and 55 orange plants fruited during the year. The fruits were of fair quality and the majority were sold in Georgetown. A record of the yields of the individual grapefruit and orange trees is being kept.

Budding and Seedling Limes.

23. The experimental area of $2\frac{1}{2}$ acres budded and $2\frac{1}{2}$ acres seedling limes continues to make satisfactory growth. The crop was a very short one. The budded area yielded 99 barrels and the seedlings 40 barrels.

Propagation Work.

24. Budding was carried out during the year on a small scale, to supply plants to farmers in the district, budwood being taken from selected plants at the Station.

Other Fruits.

25. The area under budded and grafted pears was well maintained during the year, but the yields from all the trees were poor and some of the fruits were of rather inferior quality. A composite dressing of fertilizers was applied at the rate of $3\frac{1}{2}$ lb. per tree. A record of the yields of individual pear trees is also being kept.

Miscellaneous.

26. *Fish Poison Plants*.—Again no cultivation was carried out on this area during the year, the plants maintaining themselves. Samples of roots and stems were collected and sent to the Chemist-Ecologist for analysis.

British Honduras Mahogany.—The trees continue to make satisfactory progress in spite of attacks by beetles.

Black Pepper (Piper Nigrum).—These plants did not make satisfactory progress during the year, though four of them gave a small yield. It was decided to plant the pepper on a new site and a plot was selected at the foot of the hill below the rubber house and planted with cuttings in July. These have made a fair start.

Chalmoogra Oil (Hydnocarpus Anthelminta).—Three plants are still growing but only two plants of the *Hydnocarpus Venenata* have survived.

Neem. (Azadinachta indica).—The one plant is still growing well.

Historical Cacao.—(From Berbice River).—Three plants have borne fruit.

Tung Oil (Aleurites montana).—The three plants planted in June, 1934, were all destroyed by wild deer. Subsequently thirteen more plants of this species and five of *Aleurites fordii* were received from the Botanic Gardens and planted out at the hill foot below the rubber house. These have made a good start.

Calapogonium muconoides has now been established on a portion of the citrus orchard, and is proving a very excellent cover crop.

Ginger.—Three varieties, Dominica, Canton and Jamaica ginger, were planted out on pegasse soil, but very poor results were obtained. The Dominica ginger failed entirely. Trials of Canton and Jamaica ginger were also tried on laterite soils and have given better results. A further trial is being carried out with these varieties.

Oil Palms.—These plants continue to make good progress and only one weeding was necessary during the year and two plants are showing signs of flowering.

Citronella.—The Citronella grass growing on the pegasse soil has flourished during the year.

WAUNA SUB-STATION.

27. This Station was well maintained during the year. The coconuts obtained from Essequebo continue to thrive, as also the six plants from Moruca.

The Dwarf variety from St. Lucia has, however, made a very little progress during the year. An application of fertilizers was given to these latter plants.

Citrus.

28. The grapefruit and orange plants have made some improvement during the year, three Marsh grapefruit and seven orange plants, including Dancy Tangerine, have borne fruit. The budded limes have been fairly satisfactory.

Miscellaneous.

29. The Black and White Haiari in the open have made very good growth and are now well established. Four plants of the White Haiari flowered during the year, specimens of flowers and pods were forwarded to the Botanist and identified later at Kew as *L. Nicou*.

30. *Calapogonium mucunoides* proved a successful cover.

PESTS AND DISEASES.

31. *Sclerotium Coffeicolum* Stahel.—This disease made its appearance very late during the year in most of the grants in the Barima, Aruka and Koriabo districts. Control measures were again carried out, including the burning of diseased materials.

32. *Phloem Necrosis* of coffee was again noticeable during the year throughout the district, especially on the older cultivations.

33. *Hardback beetles* (*Cockles*).—These were very noticeable in the Aruka and Koriabo districts where the bulk of the ground provisions are grown.

34. *Coushi Ants*.—This pest was very prevalent during the year; farmers have bought small quantities of carbon bisulphide from Messrs. Garnett & Co.'s store in the district, and further assistance was given by supplying small quantities from the Station to certain farmers.

DISTRIBUTION OF SEEDS AND PLANTS.

35. The following were distributed from the stations during the year:—

Budded Grapefruit Marsh	...	...	197 plants.
Budded Oranges	...	...	134 "
Budded Limes	...	...	100 "
Cacao Seedlings	...	...	4,642 "
Cacao Pods	...	...	100 pods.
Sour Orange	...	...	8,000 seeds.
Crowa Suckers	...	...	12

L. E. McKINNON,
Agricultural Instructor.

March 31, 1936.

DEPARTMENT OF AGRICULTURE.

REPORT OF THE PLANTBREEDER FOR THE YEAR 1935.

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REPORT OF THE PLANT BREEDER FOR THE YEAR 1935.

STAFF.

L. E. W. Codd, M.Sc.—Plant Breeder.
J. Indrobeharry —Agricultural Assistant.
I. Dewar —Clerical and Field Assistant.

Mr. I. Dewar was seconded to the Berbice District from September 1 to November 30 during the absence of Mr. E. M. Morgan on leave.

GENERAL.

2. Visits were paid to the Essequibo and Berbice Districts in connection with the laying down of padi experiments.

3. *Padi grown on the Central Rice Experiment Station during 1935.*—A record of the padi grown on the Central Rice Experiment Station, Georgetown, during 1935 is shown in Table I below :—

TABLE I.
PADI GROWN ON THE CENTRAL RICE STATION, 1935.

Variety.	Spring Crop, lb.	Autumn Crop, lb.	Total, lb.
No. 79 ...	583	33,711	34,294
Demerara Creole... ..	16,356	6,074	22,430
Blue Stick	...	1,852	1,852
Karimganj	...	636	636
No. 75	...	365	365
No. 78	...	918	918
H 6	...	494	494
D 88	...	523	1,523
D 89	...	525	525
D 91	...	543	543
D 92	...	511	511
D 97	...	556	556
D 99	...	604	604
D 110	...	533	533
D 114	...	1,034	1,034
D 115	...	664	664
D 116	...	646	646
B 1	...	468	468
B 2	...	408	408
B 4	...	399	399
B 6	...	418	418
B 8	...	448	448
B 13	...	484	484
C 4	...	396	396
Local Type	...	427	427
Unity	...	438	438
Kalyaman	...	887	887
Minalabon	...	335	335
Hybrids and Progeny Rows ...	1,652	3,712	5,364
Total	18,591	59,009	77,600

4. The No. 79 and Demerara Creole padi was transferred to the Agricultural Superintendent, East Demerara, for storage and distribution. The remainder was handed over to the Live-stock Division.

PADI EXPERIMENTS.

5. A list of the padi experiments carried out during 1935 is given below in Table II. Whenever possible, local types were included for comparison with pure line varieties.

TABLE II.
PADI EXPERIMENTS CARRIED OUT DURING 1935.

Situation.	Experiment.	No. of Varieties or Treatments.	Layout.
BERBICE—			
No. 63, Upper Conrantlyne ...	Variety Trial ...	8	One 8 x 8 Latin Square.
Pln. Whim, Lower Corentyne ...	Variety Trial ...	8	do.
Pln. Brahan, West Coast ...	Variety Trial ...	8	Six randomised blocks.
ESSEQUIBO—			
Henrietta Experimental Station ...	Variety Trial ...	8	Two 8 x 8 Latin Squares.
	Strain Trial ...	5	Two 5 x 5 Latin Squares.
	Spacing Trial ...	5	do.
	Ages of Seedlings ...	5	do.
Sans Souci, Wakenaam ...	Variety Trial ...	8	One 8 x 8 Latin Square.
DEMERARA—			
Vreed-en-Hoop, West Coast ...	Variety Trial ...	8	One 8 x 8 Latin Square.
Pln. Hope, East Coast ...	Variety Trial ...	8	do.
Experimental Station, Georgetown ...	Variety Trial No. 1... ..	8	do.
	Variety Trial No. 2... ..	8	do.
	Variety Trial No. 3... ..	9	One 9 x 9 Latin Square.
	Variety Trial No. 4... ..	9	do.
	Ages of Seedlings ...	5	Two 5 x 5 Latin Squares.
	Manurial Trial No. 1 ...	5	do
	Manurial Trial No. 2 ...	10	8 randomised blocks.
	Manurial Trial No. 3 ...	3	2 randomised blocks.

6. The trials at No. 63 and Plantation Brahan were laid down on unirrigated land and the seed was broadcast. All other trials were transplanted on irrigated land. The results of the experiments carried out in Berbice and Essequibo will be published in the Agricultural Journal of British Guiana. The results of all trials conducted in Demerara are given in this report.

7. *Variety Trials conducted at Vreed-en-Hoop, West Coast and Pln. Hope, East Coast, Demerara.*—The results of these trials are shown in Table III below :

TABLE III.
RESULTS OF TRIALS AT VREED-EN-HOOP AND PLANTATION HOPE.

Situation	Hope	Vreed-en-Hoop.	
Date Sown	28. 5. 35	5. 6. 35	
Date Transplanted	1. 7. 35	19. 7. 35	
Date Reaped	30. 10. 35	6. 11. 35	
Layout	One 8 x 8 Latin Square	One 8 x 8 Latin Square.	
Variety.	Padi lb. per acre.	Variety.	Padi lb. per acre.
No. 75	4,008	No. 79	3,672
Kalyaman	4,005	Blue Stick	3,542
D 114	3,978	Local (Leguan)	3,520
No. 79	3,978	No. 78	3,480
Blue Stick	3,910	D 114	3,478
Demerara Creole (Expt. Station seed).	3,900	Kalyaman	3,450
Demerara Creole (Hope seed)	3,748	Demerara Creole	3,212
No. 78	3,515	No. 75	3,132
Significant difference (P=0.05)	284	Significant Difference (P=0.05)	225

8. Both trials showed a high degree of uniformity, the lowest standard error of the series being recorded in the Vreed-en-Hoop trial. The Hope trial showed no significant differences between the first seven varieties. The first six varieties, however, were significantly better than No. 78. In the Vreed-en-Hoop trial, the first six varieties were not significantly different, but they were all superior to *Demerara Creole* and No. 75. The *Local* padi included in this trial consisted of a mixed sample by Mr. A. Rayman from Leguan. A number of single plant selections were made from this sample, the predominant type being a longish-grained, non-pigmented variety resembling *D 110*, i.e., intermediate between *Demerara Creole* and *Blue Stick* in grain, tendency to shatter and other botanical characters.

9. *Variety trials No. 1 and No. 2 conducted at Georgetown.*—The results of variety trials No. 1 and 2 laid down at the Central Rice Station are summarised below in Table IV.

TABLE IV.
RESULTS OF TRIALS AT GEORGETOWN.

	Trial No. 1.	Trial No. 2.	
Date Sown	15. 4. 35	8. 6. 35	
Date Transplanted	22. 5. 35	15. 7. 35	
Date Reaped	24. 9. 35	7. 11. 35	
Layout	One 8 x 8 Latin square	One 8 x 8 Latin square	
Variety.	Padi lb. per acre.	Variety.	Padi lb. per acre.
Karimganj	3,675	D 114	3,098
No. 79	3,175	D 116	2,875
No. 78	3,085	D 115	2,800
H 6	2,995	D 110	2,295
Blue Stick	2,940	Demerara Creole	2,130
Kalyaman	2,850	Blue Stick	2,083
Demerara Creole	2,795	No. 79	1,958
Minalabon	2,305	Unity	1,945
Significant difference (P=0.05)	263	Significant difference (P=0.05)	506

10. In trial No. 1, two recently imported varieties, *Karimganj* from Mandalay and *Minalabon* from the Philippine Islands, were tested against old standard varieties. *Karimganj* headed the list and was significantly better than all other varieties. Unfortunately its grain is too short to be of commercial value locally. No. 79 gave a significantly higher yield than *Kalyaman*, *Demerara Creole* and *Minalabon*. *Minalabon* was significantly inferior to all other varieties.

11. In trial No. 2, three varieties of similar type, *D 114*, *D 115* and *D 116*, outyielded the remaining varieties by a substantial margin. The differences between the remaining five varieties were not significant.

12. *Variety Trials No. 3 and No. 4 Conducted at Georgetown.*—The results of variety trials Nos. 3 and 4 laid down at the Central Rice Station are summarised in Table V below :

TABLE V.
RESULTS OF TRIALS AT GEORGETOWN.

	Trial No. 3.	Trial No. 4.	
Date Sown	15. 6. 35	2. 7. 35	
Date Transplanted	26. 7. 35	16. 8. 35	
Date Reaped	14. 11. 35	4. 12. 35	
Layout	One 9 x 9 Latin square	One 9 x 9 Latin square	
Variety.	Padi lb. per acre.	Variety.	Padi lb. per acre.
D 99	3,074	B 13	2,865
D 97	2,975	No. 79	2,751
D 91	2,911	B 6	2,675
D 89	2,891	Demerara Creole	2,671
D 88	2,771	B 8	2,649
Demerara Creole	2,633	B 1	2,622
No. 79	2,546	B 2	2,485
D 92	2,415	B 4	2,422
Blue Stick	2,126	C 4	2,391
Significant difference (P=0.05)	301	Significant difference (P=0.05)	260

13. In trial No. 3, *D 97* and *D 99*, both resembling *No. 79* in grain character, headed the list, but were not significantly better than the three Seta Patna varieties *D 88*, *D 89* and *D 91*. The varieties *D 89* and *D 91* gave significantly higher yields than *No. 79*, *D 92* and *Blue Stick*.

14. In trial No. 4, seven hybrid strains were tested against *No. 79* and *Demerara Creole*. No significant differences occurred between the first six varieties, though *B 13* and *B 6* showed signs of promise.

15. *Summary of Variety Trials conducted during 1935.*—A general comparison between varieties tested in transplanted trials during 1935 will be seen below in

Table VI. In each trial, the varietal means have been calculated as percentages of the *Demerara Creole* yield, which has been taken as the standard. Where a variety appears in more than one trial, the average of the percentage values has been taken.

TABLE VI.
SUMMARY OF TRANSPLANTED TRIALS CONDUCTED DURING 1935.

Variety.	No. of Trials.	Average yield per acre compared with Demerara Creole (100.0).
D 116	1	135.0
Karimganj	1	131.0
D 115	2	122.0
D 114	6	116.3
D 97	1	112.7
D 91	1	110.3
D 89	1	109.5
Local Type (Wakanaam)	1	109.5
D 99	3	108.8
D 110	1	107.7
Kalyaman	5	107.5
B 13	1	107.3
H 6	1	107.1
No. 79	9	105.0
Local Type (Leguan)	1	104.9
D 88	1	104.1
B 6	1	100.2
No. 75	2	100.1
Demerara Creole	9	100.0
D 92	3	99.9
No. 78	6	99.6
B 8	1	99.2
Blue Stick	8	99.0
B 1	1	98.2
B 2	1	93.0
B 4	1	90.7
C 4	1	89.5
Minalabon	1	82.4

16. It will be seen that there are a number of new varieties which outyield the old standard varieties *No. 79* and *Demerara Creole* by substantial amounts. The most promising appears to be *D 114* which, over six trials, gave an average of 16% increase in yield over *Demerara Creole*. Of the true Seta Patna types, *D 91* and *D 89* appear to be the best, but these have not yet received a thorough testing. *Kalyaman*, also a Seta Patna type, gives a higher yield than *Demerara Creole*, especially in the Essequibo District. Of the medium length rices, *D 97* and *D 99* showed signs of being better than *No. 79*.

Manurial Trials.

17. *No. 1. Green Manuring and Artificial Fertilisers.* This experiment was suggested by a result obtained in 1934 when a few plots which received green manure in 1933 and artificials in 1934 gave exceptionally good yields. A properly designed experiment was laid down in 1935 and will be continued in 1936. The treatments decided upon were as follows:—

Autumn Crop, 1935.	Autumn Crop, 1936.
1. Control—no fertiliser	> Residual effect.
2. Green Manure, 2 tons per acre	> Residual effect.
3. Green Manure, 2 tons per acre	> Residual effect + 2 cwt. S/A + 2 cwt. Superphosphate
4. Green Manure, 2 tons, 2 cwt. S/A + 2 cwt. Superphosphate per acre	> Residual effect. [per acre.
5. 2 cwt. S/A + 2 cwt. Superphosphate per acre	> Residual effect.

18. Treatments 2 and 3 are similar in 1935, but in 1936, treatment 3 will receive a dressing of 2 cwt. sulphate of ammonia and 2 cwt. superphosphate per acre.

19. Seed was sown on May 28 and the seedlings were transplanted on June 26. Green manure, which consisted of *Vigna repens* grown on an adjacent bed, was puddled in one day before transplanting. The dressing of artificial fertilisers was split in two equal portions, the first application being made on July 2 and the second application on August 1. The experiment was laid down in two 5 x 5

Latin Squares and the results obtained during the autumn crop 1935 are set out in Table VII. below:—

TABLE VII.
RESULTS OF MANURIAL TRIAL NO. 1.

Treatment.	Padi. lb. per acre.	Percentage of Mean.	Increase over central. lb. per acre
Control—no fertiliser ...	1,848	...	...
Green manure, 2 tons per acre ...	2,148	...	300
Green manure, 2 tons per acre ...	2,080	...	232
Green manure, 2 tons 2 cwt. S/A + 2 cwt. Super-phosphate per acre ...	2,672	...	824
2 cwt. S/A + 2 cwt. Superphosphate per acre ...	2,604	...	756
Significant Difference ($P=0.05$) ...	206	...	...

20. All treatments gave significant increases over the control, and the plots receiving artificial fertilisers gave a significantly higher yield than the green manured plots. In no case did the application produce a profitable result.

21. *No. 2. Application of fertilisers at different stages of growth.* In this trial dressings of 2 cwt. sulphate of ammonia per acre and 2 cwt. superphosphate per acre were applied singly and in combination at various growth stages, namely :

- (a) at transplanting.
- (b) 30 days after transplanting.
- (c) $\frac{1}{4}$ of the dressing applied at transplanting, $\frac{1}{2}$ at 30 days after transplanting and $\frac{1}{4}$ shortly before flowering.

22. The mean yields observed, expressed in lb. per acre, are set out in Table VIII. below. The control plots gave a mean of 1,975 lb. per acre.

TABLE VIII.
MEAN YIELDS RECORDED IN MANURIAL TRIAL NO. 2 IN LB. PER ACRE.

Time of Application.	Fertiliser.			Means for Times of Application.
	Sulphate of Ammonia.	Super-phosphate.	Sulphate of Ammonia + super-phosphate.	
Transplanting ...	2,255	2,265	2,455	2,325
30 days after transplanting ...	2,510	2,000	2,610	2,373
$\frac{1}{4}$ at transplanting ...	2,415	2,420	2,680	2,505
$\frac{1}{4}$ 30 days after ...				
$\frac{1}{4}$ before flowering ...	...	...	...	...
Means for fertilisers ...	2,393	2,228	2,582	...

23. The results of the trial were disappointing. In no case did the increase in yield cover the cost of the fertiliser—the nearest approach being the dressing of superphosphate which yielded 2,420 lb. per acre. This represents an increase of 3.2 bags, while the fertiliser cost \$3.25.

24. *No. 3. Molasses as fertilisers.*—A small trial was laid down to test the value of molasses as a fertiliser. The results obtained are shown below.

TREATMENT.	MEAN YIELDS LB. PER ACRE.
Control—no molasses ...	2,000
Molasses—5 tons per acre...	2,940
Molasses + Sulphate of Ammonia and Super-phosphate (25 lb. of each per acre) ...	3,040

25. Both dressings gave greatly increased yields over the control plots, but owing to the small number of replications no statistical analysis was made. This trial will be continued next year.

RICE BREEDING.

26. During the year two varieties were obtained from Surinam, while 17 new types were selected from local cultivations as follows :—

DISTRICT.	NO. OF VARIETIES SELECTED.		
Demerara ...	...	...	9
Berbice ...	...	...	3
Wakenaam ...	...	...	2
Leguan ...	...	...	3
Total ...	...	...	17

27. 160 varieties were grown in observation plots during 1935, the best plots being reserved for variety trials in 1936.

28. The following hybrid selections were grown :—

Americano 1600 x Demerara Creole ...	30 seventh generation plots
Mexican Edith x Demerara Creole ...	9 seventh generation plots
Kristnakatakulu x No. 79 ...	18 sixth generation plots
Kristnakatakulu x No. 79 ...	21 seventh generation plots

29. The selections from *Americano 1600 x Demerara Creole* and *Mexican Edith x Demerara Creole* are now breeding true to type and the best types were included in 1935 variety trials. The selections from *Kristnakatakulu x No. 79* are approaching homozygosity.

MISCELLANEOUS CROPS.

Papaws.

30. The following varieties were introduced during the year :

Variety.	Origin.	Remarks.
New Era ...	Queensland	Failed to germinate
Long Tom ...	do.	do.
2 A.S. ...	do.	do.
Seychelles ...	Trinidad	
Puerto Rico ...	do.	

31. Selection with the *Local No 1* (Walcott) and *Panama* varieties has been continued and seven plots grown from handpollinated fruits were kept under observation.

32. The F_1 plants obtained by crossing these two varieties reciprocally are now fruiting and exhibit many interesting features. A description of the parents and F_1 plants will be seen below :

Character Studied.	Panama.	Local No. 1.	F_1 Panama x Local No. 1.	F_1 Local No. 1 x Panama.
Size and shape of Fruit ...	Small, round	Large, oblong	Small, round	Fairly large, round.
Flavour ...	Excellent	Fair	Rather poor...	Excellent.
Keeping Quality ...	Good	Poor	Good	Fairly good.
Pollen bearing trees ...	3 or 4 flowers in axil of leaf, at least one of which sets fruit.	Large inflorescence of purely male flowers.	Large inflorescence of purely male flowers.	Similar to <i>Panama</i> , but fruit occasionally develops.

The object in carrying out this cross was to combine the size of the *Local No. 1* with the flavour and keeping quality of the *Panama*. In the cross *Panama x Local No. 1* all the undersirable characters are combined, so these plants were discarded.

In the reciprocal cross, however, the reverse is the case and large size is combined with good flavour and keeping quality. Selected F_1 plants of this cross have been back-crossed with *Panama*. It would appear that size of fruit is inherited

from the maternal parent, while flavour and degree of "Maleness" of the pollen bearing trees are transmitted by the male parent, the reason for this is not clear without cytological information and, unfortunately, a full investigation of the problem, however interesting academically, is impossible with the funds and space available.

Pineapples.

34. One variety was obtained from the Forest Station, Mazaruni, while four suckers of the "Queen" pine were obtained from Henrietta Experiment Station, Essequibo.

Onions.

35. The following varieties were received :—

VARIETY.		ORIGIN.
Red	}	College of Agriculture,
White		Poona, India.
Varela's Purple		Santa Cruz, Teneriffe.
Crystal White Wax		"
Yellow Bermuda		"

These were kept under observation at Sub-station Cecelia, and the results are given in the report of the Agricultural Superintendent, East Demerara.

Pigeon Peas.

36. The following varieties were received :—

VARIETY.		ORIGIN.
Type 1	}	Central Provinces,
Type 5		Nagpur, India.
E. B. 3		
White		I. C. T. A. Trinidad.

37. The three varieties from the Central Provinces are early maturing, dwarf types. They do not continue bearing as long as the tall types, but the cost of picking is lower on account of their dwarf habit.

38. The variety from Trinidad is a tall, good yielding type with a very attractive, pure white seed. Every effort is being made to keep this variety from being contaminated with pollen from the plots with greyish-white or brown seeds. The yields given by the various varieties under observation on the Experiment Station are shown below :—

Variety.	Colour of Seed.	Wt. of good seed reaped.		Wt. of bad seed reaped.		Yield per acre (lb. good seed).
		lb.	oz.	lb.	oz.	
Dominica	... Brown	6	9	3	0	197
Dominica	... White	8	11	4	10	261
Silvios	... Brown	10	5½	5	7	309
Silvios	... White	5	13	4	0	159
Accibenos	... Brown	4	14	3	13	146
Mites	... Brown	5	10	3	0	169
Hawaii	... Brown	13	8	3	0	405
Barbados	... Brown	6	4	4	7	138
Barbados	... White	4	13	3	1	144
Trinidad No. 1	... White	3	6	3	8	101
Type 1	... White	2	6		*	71
Type 5	... White	3	0		*	77
E. B. 3	... White	2	9		*	77
Trinidad No. 2	... Clear White	4	12	3	0	143

*Weight not recorded.

Cassava.

39. A collection is being made of the various types of cassava in the Colony. The results of a preliminary yield trial with varieties from the Mahaica-Mahaicony district are shown below:—

Variety.	Description.	Area of Plot. (Sq. rods)	Wt. of Tubers. Reaped. lb.	Yield per. Acre. lb.
Locust ...	Sweet ...	4½	64½	4,300
Locust Table Tree ...	" ...	3½	17½	1,500
Locust Table Tree ...	" ...	3½	19	1,626
Blue Stick ...	" ...	2½	*	...
Head ...	Bitter ...	4	110½	8,325
Butter Stick ...	Sweet ...	4½	*	...
Portuguese ...	" ...	9½	215	6,789
Chip Leaf or Silk Cotton ...	Bitter ...	3½	57	4,886
Coomacka or Silk Cotton ...	" ...	4½	89	5,933
Frances Henery ...	" ...	7	110½	4,714
Willie Baptiste ...	" ...	2	45½	6,825
Hercules ...	" ...	5	97	5,820
Uncle Mac Table Tree ...	Sweet ...	2	15½	2,363
Uncle Mac ...	" ...	2	15½	2,363
Uncle Mac Sweet ...	Bitter ...	2	16½	2,438
Papee ...	Sweet ...	2	20½	3,113
Buck ...	" ...	2	5½	863
Buck Stick ...	" ...	2	18½	2,813
Black Stick ...	" ...	2	18½	2,813
Isaac ...	" ...	2	48½	7,438
Young Girl or Yellow Girl ...	" ...	2	36½	5,475
Brown Girl ...	" ...	4	25	1,375
Sebeeyn ...	Bitter ...	2	24½	3,675
Solario ...	Sweet ...	3	26½	2,675
Lessefat or Lady Fat ...	" ...	1	8½	2,476
Tamar ...	" ...	1	5½	1,575
Lessefat ...	" ...	1½	8	1,600
Raj Paul ...	" ...	3	18	1,800

* Weight not recorded.

L. E. CODD,
Plant Breeder.

February 15, 1936.

DEPARTMENT OF AGRICULTURE.

REPORT ON THE SUGAR EXPERIMENT STATIONS
FOR THE YEAR 1935.

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REPORT ON THE SUGAR EXPERIMENT STATIONS FOR THE YEAR 1935.

GENERAL.

Staff.

C. H. B. Williams, M.A., A.I.C.T.A., Dip. Agr.	—Sugar Agronomist.
C. Cameron	—Field Manager.
L. A. Forte	—Field Assistant.
B. A. MacArthur	—Field Assistant.
St. G. Cooper, Dip. Agr.	—Field Assistant.
L. A. Robinson	—Laboratory Assistant.
H. B. Singh	—Laboratory Assistant.
J. M. Smith	—Laboratory Assistant.
J. B. Bourne	—Statistical Clerk.

Various members of the Staff were absent from duty as follows :—

Mr. Forte, April 16 to July 21 (Study Leave) ;
Mr. Cooper, August 11 to 27 (Sick Leave) ;
Mr. MacArthur, August 21 to October 7 (Vacation Leave) ;
Mr. Bourne, October 17 to November 16 (Sick Leave).

On March 1, Mr. Robinson was seconded for soil investigation work with Messrs. Booker Bros., McConnell & Co., Ltd., Mr. J. M. Smith, Laboratory Assistant, left the Stations' employ at the same time to assist Mr. Robinson in his duties. Mr. H. R. Wren, Field Assistant, left on March 31.

Committee.

2. The following members formed the Sugar Experiment Stations' Committee for the year :

'The Director of Agriculture	—Chairman.
Mr. J. C. Gibson	—Pln. Port Mourant.
Hon. M. B. G. Austin	—Messrs. Curtis, Campbell & Co., Ltd.
Mr. A. Murison	—Pln. Uitvlugt.
Mr. J. Bee	—Pln. Albion.
Mr. R. E. Rhodes	—Pln. Diamond.
Mr. G. M. Eccles	—Pln. Blairmont.
Mr. C. L. C. Bourne	—Secretary.

Mr. W. H. Richards, of Pln. Lusignan, and subsequently Mr. F. F. Ross, of Pln. Rose Hall, acted for Mr. Gibson during his absence from the Colony. Mr. J. Sutherland, of Pln. Ogle, acted for Mr. Bee during the latter's absence abroad.

Finance.

3. The sum of \$24,178.00 was voted from the funds of the Sugar Experiment Stations' Committee for the working of the Station during the year. A total of \$24,295.44 was spent. Receipts from Assessments for the year amounted to \$17,722.80, those from Sale of Canes to \$3,720.52, and miscellaneous receipts to \$456.48. A total of \$4,139.87 was spent from a grant of \$4,140 made from the Colonial Development Fund. The joint contribution from Messrs. Imperial Chemical Industries and Messrs. Booker Bros., McConnell & Co., Ltd., was continued, \$2,250.38 being spent under this head. Of the \$609.28 remaining from the special grant of the British Guiana Sugar Producers' Association, allocated to the continuation of the work with the Amazon fly, \$569.50 were expended during the year.

Equipment.

4. The office section of the main building, which was in a bad state of repair, has been thoroughly overhauled and an extension made to relieve the cramped conditions under which the staff was working. It is hoped to repair the laboratory section of the building at a later date. Painting and minor repairs have been carried out on the various buildings and bridges. A new tent boat has been built and a shed erected for its shelter. A new irrigation—drainage pump, capable of delivering 6,000 gallons per minute, was purchased on June 1. Diesel oil is the fuel used and this unit is proving more economical and efficient than the old one. It is mounted in a locally built punt. The erection of two large sluices was started, and the major portion of the work completed, during the year. One of these serves as a water-lock between the navigation and drainage canals at Field No. 1 West, and is used for passing the pump from one system to the other. The second sluice separates the navigation systems of Pln. Ogle and the Station. It is opened to permit the passing of punts between the Plantation and the Station.

CANE BREEDING AND INTRODUCTION.

5. The number of Demerara seedlings undergoing field experimentation and those undergoing further multiplication and selection are listed, under their year of production in Table I.

TABLE I.

DEMERARA SEEDLINGS IN REPLICATED FIELD TESTS AND UNDERGOING MULTIPLICATION AND SELECTION, DECEMBER, 1935.

Year.	Number of Seedlings	
	In Tests.	Under Selection.
1912	1	...
1913	1	...
1917	5	1
1918	1	1
1920	5	...
1921	10	1
1922	4	3
1923	1	...
1924	1	...
1927	4	...
1928	11	...
1929	13	1
1930	56	10
1931	2	1
1932	1	13
1933	...	55
1934	...	18,132
Total	116	18,218

6. From the 15,193 seedlings of the 1933 group transplanted to the field, 709 were judged from their appearance to be worthy of further attention. These stools were weighed, the number of stalks per stool counted and the total solids in juice determined with the aid of a Zeiss refractometer. Of the batch, 146 were discarded and 563 extended to the field after these determinations had been made.

7. In order to determine the total solids in juice, every stalk in the stool was bored at three points (near the bottom, at the middle, and near the top) with a cork borer which extracted a core of pith. From each core three drops of juice were expressed with the aid of a pair of pliers. The juice from all the cores of each stool was mixed in a test tube and the reading taken on the refractometer. Tests carried out here show that such readings are slightly above (average of 1.4 points) those obtained if the canes are passed through a mill and the reading made on the expressed juice. The positive coefficient of correlation between two parallel sets of readings is, however, high and significant; 0.75.

8. Seedlings in the basket stage are planted out in the field at intervals of 2 ft. along rows which are 5 ft. apart. The 563 seedlings of the 1933 group, selected as described above, were, in accordance with local commercial practice, planted in

continuous rows. A second selection was carried out at the end of 1935 and 55 chosen for further testing. On this occasion the samples for the refractometer determinations were taken with a sampler which pierced the cane and delivered three drops of juice to a test tube. A series of tests having indicated that a boring taken at the 5th joint below the point of attachment of the sheath of the oldest green leaf gives a reading closely approximate to the mean figure for all the juice of the cane, borings were made on every cane of a clump (about 8 stalks) at this point only. Selections were based mainly on the percentage of total solids in the juice and the mean weight of cane produced per linear foot of row (most of the original stools had yielded enough cuttings to permit the establishment of two to four rows). Table II compares the results obtained at the first (grown directly from seed) and second (grown from cuttings) selections.

TABLE II.
COMPARISON OF DATA FROM FIRST (SEEDLING) AND SECOND (CUTTING) SELECTIONS OF THE 1933 SEEDLINGS.

Parent.	No. of Seedlings Planted.	Selections.				Mean Total Solids in Juice.		Mean Weight in lbs.		Mean Stalks per Stool 1st Selection.		
		1st.		2nd.		Selections.		Per Stool 1st Selection.	Per Row-ft. 2nd Selection.			
		No.	%	No.	%	1st.	2nd.					
D. 53/27	x	◇ 10	791	42	5.3	8	1.0	19.1	20.0	27.6	19.2	7
S.C. 12 (4)	x	" "	2,066	33	1.6	6	.3	19.6	19.7	27.3	16.6	8
D. 666/18	x	" "	1,456	152	10.4	33	2.3	19.1	20.1	28.2	18.6	7
D. 602/22	x	" "	65	8	12.3	...	...	19.7	...	27.4	...	8
◇ 10	x	B.H. 10 (12)	377	2	.5	1	.3	19.8	15.2	29.2	14.4	8
M.P.R. 44	x	◇ 10	63	4	6.3	...	...	21.8	...	30.1	...	9
◇ 10	x	D. 625	1,479	50	3.4	...	...	19.4	...	31.9	...	9
D. 666/18	x	D. 625	651	42	6.4	2	.3	19.5	19.1	29.5	11.9	8
◇ 10	x	Co. 281	533	2	.4	...	...	21.4	...	30.1	...	9
S.W. 3	x	◇ 10	254	6	3.4	...	...	21.6	...	32.0	...	9
D. 66/30	x	D. 625	910	28	3.1	1	.1	18.7	19.2	32.0	11.7	8
Co. 281	x	◇ 10	416	68	16.3	3	.7	19.3	19.9	28.1	7.6	16
G. 312	x	" "	255	4	1.6	...	...	22.6	...	34.6	...	10
P.O.J. 2878	x	" "	195	11	5.6	...	...	20.3	...	36.2	...	13
◇ 10	x	S.W. 3	247	4	1.6	...	...	21.4	...	30.0	...	10
P.R. 803	x	◇ 10	84	3	3.6	...	...	20.3	...	29.2	...	10
D. 684/21	x	" "	722	17	2.3	1	.1	19.2	21.3	29.0	19.2	7
T. 1198	x	" "	147	12	8.2	...	...	21.8	...	29.7	...	9
D. 78/27	x	" "	299	13	4.3	...	...	19.1	...	26.4	...	8
D. 219/30	x	" "	195	5	2.6	...	...	20.1	...	32.9	...	10
D. 1159/22	x	" "	383	6	1.6	...	...	18.8	...	38.4	...	8
Berbice	x	" "	1,167	22	1.9	...	...	19.8	...	26.7	...	8
D. 438/21	x	" "	819	5	.6	...	...	21.4	...	23.3	...	7
D. 525	x	" "	615	13	2.1	...	...	18.9	...	32.3	...	10
D. 88/30	x	" "	450	9	2.0	...	...	19.2	...	30.2	...	9
D. 895/22	x	" "	45	1	2.2	...	...	18.8	...	59.0	...	17
D. 2/30	x	" "	105	1	.9	...	...	19.8	...	72.0	...	14
C. Roxa	x	" "	52	...	...	...	...	...	...	...	...	...
M.P.R. 42	x	" "	26	...	...	...	...	...	...	...	...	...
P.O.J. 2878	x	D. 625	6	...	...	...	...	...	...	...	...	...
B.H. 10 (12)	x	◇ 10	14	...	...	...	...	...	...	...	...	...
M.P.R. 145	x	" "	5	...	...	...	...	...	...	...	...	...
D. 814/12	x	" "	60	...	...	...	...	...	...	...	...	...
D. 684/21	x	D. 602/22	105	...	...	...	...	...	...	...	...	...
D. 75/23	x	◇ 10	39	...	...	...	...	...	...	...	...	...
D. 11/28	x	" "	15	...	...	...	...	...	...	...	...	...
P.O.J. 2828	x	Sorghum	25	...	...	...	...	...	...	...	...	...
P.O.J. 2725	x	" "	5	...	...	...	...	...	...	...	...	...
D. 1/32	x	" "	34	...	...	...	...	...	...	...	...	...
Total	...	...	15,175	563	3.7	55	.4	...	...	...	...	...

9. The work has served to confirm the extreme difficulty of making selections in the first-year stage, for the canes change considerably when grown from cuttings. Thus none of the twenty-nine seedlings which topped the list in the first selection did well enough, when grown from cuttings, to merit further attention and they have been dropped.

10. The coefficient of correlation between the total solids at the two selections and that between the weight per stool and weight per row-foot, have been calculated for the 55 varieties which have been retained. The slight positive correlation obtained between the two lots of refractometer figures is not statistically significant. When the weight per stool and weight per row-foot at the first and second selections, respectively, were compared, a low negative coefficient of correlation was found. The implication of these findings is that too much stress must not be laid

on the first selection. Since in commercial practice cane is grown from cuttings, selection of new seedlings must be based mainly on their behaviour when so propagated.

11. The parentage of the 1934 seedlings basketed and transplanted to the field is given in Table III.

TABLE III.
PARENTS OF 1934 SEEDLINGS BASKETED AND TRANSPLANTED.

Parents.			Number of			
Female.	Male.		Arrows Used.	Boxes Sown.	Seedlings Basketed.	Seedlings Planted in Field.
Armstrong	x Diamond 10	...	3	4	100	87
Ba. 6835	x "	...	6	4	20	15
B.H. 10 (12)	x "	...	1	...	...	...
Bourbon	x "	...	3	3	50	15
B. 1529	x "	...	6	5	135	80
Co. 213	x "	...	4	2	10	10
Co. 231	x "	...	5	3	14	13
D. 625	x D. 66/30	...	7	3	...	...
F.C. 916	x Diamond 10	...	4	2	...	...
G. 119	x "	...	2	...	...	...
I.C.T.A. 36	x "	...	3	4	...	...
Meligeli	x "	...	1	2	30	15
M.P.R. 42	x "	...	4	3	...	...
M.P.R. 49	x "	...	5	...	...	...
M.P.R. 145	x "	...	3	1	...	...
M.P.R. 151	x "	...	5	2	...	...
P.R. 803	x "	...	1	1	189	165
P.R. 826	x "	...	3	2	189	165
P.O.J. 2714	x "	...	2	1	...	...
P.O.J. 2725	x "	...	4	6	57	44
P.O.J. 2725	x Co. 281	...	3	3	40	33
P.O.J. 2725	x Sorghum	...	2	3	116	83
P.O.J. 2753	x "	...	2	1	...	...
P.O.J. 2753	x Diamond 10	...	15	11	6	5
P.O.J. 2753	x Co. 281	...	3	4	5	5
P.O.J. 2878	x Diamond 10	...	18	14	20	13
P.O.J. 2878	x Sorghum	...	1	2	21	15
P.O.J. 2878	x D. 625	...	6	4	37	30
P.O.J. 2878	x D. 66/30	...	4	2	...	...
T. 1198	x Diamond 10	...	5	5	862	790
S.W. 3	x "	...	1	3	1,806	840
S.C. 12 (4)	x "	...	8	12	961	825
D. 118/02	x "	...	1	1	94	30
D. 814/12	x "	...	4	4	300	240
D. 663/13	x "	...	2	1	10	7
D. 666/18	x "	...	2	4	644	450
D. 351/20	x "	...	6	2	...	...
D. 516/20	x "	...	4	3	546	360
D. 557/20	x "	...	2	1	336	195
D. 424/21	x "	...	4	4	44	30
D. 438/21 (Self)	x "	...	1	2	39	28
D. 573/22	x "	...	3	...	...	...
D. 602/22	x "	...	14	14	54	45
D. 927/22	x "	...	2	4	368	150
D. 53/27	x "	...	10	6	389	330
D. 134/27	x "	...	3	4	...	...
D. 1/23	x "	...	8	12	2,850	2,265
D. 11/28	x "	...	6	4	507	405
D. 50/28	x "	...	4	4	220	180
D. 7/30	x "	...	7	12	860	660
D. 13/30	x "	...	6	5	1,380	890
D. 51/30	x "	...	4	4	368	240
D. 63/30	x "	...	4	4	4	...
D. 66/30	x D. 625	...	2	4	94	...
D. 66/30	x Diamond 10	...	12	23	3,426	2,893
D. 73/30	x Co. 281	...	6	8	224	195
D. 73/30	x Diamond 10	...	7	10	738	464
D. 78/30	x "	...	4	5	532	360
D. 80/30	x "	...	4	8	480	345
D. 81/30	x "	...	4	5	1,688	1,335
D. 88/30	x "	...	7	3	270	150
D. 88/30	x D. 66/30	...	6	5	...	...
D. 135/30	x Diamond 10	...	3	6	698	510
D. 178/30	x "	...	11	12	1,766	1,311
D. 182/30	x "	...	4	7	808	645
D. 710/33	x "	...	2	2	6	6
D. 711/33	x "	...	3	2	...	...
D. 712/33	x "	...	3	...	...	...
D. 712/33	x D. 66/30	...	2	1	176	105
D. 713/33	x Diamond 10	...	3	1	60	60
D. 714/33	x "	...	3	1	...	...
D. 715/33	x "	...	2	...	...	...
Total	...	...	325	310	24,147	18,132

12. Table IV lists the crosses attempted in 1935 and shows the number of seedlings basketed from each cross. With a view to accelerating the selection of varieties suited to the pegassy soils (which represent about one quarter of the cane area), a proportion of the seedlings from each cross has been transplanted to baskets containing pegasse soil. There being no pegasse soil at the Station, the soil for these baskets was kindly supplied by Pln. Diamond. This group of canes (3,463 out of a total of 19,898 seedlings basketed) will be planted in pegasse soil at Pln. Uitvlugt and will undergo its first and second selections there.

TABLE IV.
PARENTS OF 1935 SEEDLINGS.

Crosses.		No. of Arrows Used.	No. of Boxes Sown.	No. of Seedlings Basketed.		
Female.	Male.			With Pegasse.	With Clay.	Total.
D. 438/21	x P.R. 820	2	3	...	...	...
D. 2/34	x D. 438/21	1	1	...	...	...
M.P.R. 151	x Co. 281	2	2	...	...	...
P.O.J. 2725	x D. 438/21	9	15	...	177	177
M.P.R. 151	x Diamond 10	2	4	4	14	18
D. 2/34	x "	2	1	...	1	1
M.P.R. 151	x P.R. 820	2	3	...	...	...
P.O.J. 2725	x Sorghum	2	2	...	5	5
D. 927/22	x P.R. 820	2	11	288	1 578	1,866
P.O.J. 2725	x "	7	14	...	64	64
M.P.R. 42	x Co. 213	2	3	...	...	...
P.O.J. 2725	x D. 66/30	7	2	24	72	96
M.P.R. 42	x "	2	1	...	7	7
P.O.J. 2725	x Co. 213	5	5	...	104	104
M.P.R. 42	x Diamond	2	3	...	6	6
D. 1/34	x P.R. 820	3	2	...	4	4
D. 49/30	x D. 66/30	4	12	482	1,484	1,966
D. 3/34	x "	4	...	...	...	...
D. 49/30	x Diamond 10	2	7	72	230	302
D. 3/34	x "	2	1	...	22	22
D. 2/31	x D. 66/30	4	12	99	1,866	1,965
P.O.J. 2725	x Co. 281	9	13	...	128	128
D. 2/31	x Diamond 10	2	14	264	734	998
P.O.J. 2725	x S.C. 12 (4)	2	4	59	180	239
M.P.R. 7	x D. 66/30	2	6	...	18	18
P.O.J. 2725	x Diamond 10	12	9	55	180	235
M.P.R. 7	x "	2	1	...	27	27
P.O.J. 2725	x D. 49/30	4	5	...	...	...
M.P.R. 7	x S.C. 12 (4)	1	...	...	...	...
P.O.J. 2725	x D. 4/28	3	4	...	...	...
P.O.J. 2878	x D. 438/21	2	2	...	...	...
D. 717/33	x Co. 213	1	1	...	...	...
D. 11/23	x Diamond 10	3	8	421	1,264	1,685
D. 717/33	x P.R. 820	1	1	...	...	...
Co. 281	x D. 66/30	5	5	15	70	85
D. 717/33	x Diamond 10	1	1	...	6	6
Co. 213	x Diamond (protected)	3	2	7	21	28
P.O.J. 2878	x P.R. 820	5	2	...	...	...
Co. 213	x Diamond 10 (unprotected)	3	3	18	55	73
P.O.J. 2878	x D. 66/30	6	4	...	24	24
D. 666/18	x "	4	8	276	768	1,044
P.O.J. 2878	x D. 49/30	6	4	...	24	24
D. 666/18	x Diamond 10	5	9	212	694	906
P.O.J. 2878	x "	9	6	...	9	9
P.R. 303	x "	2	2	...	66	66
P.O.J. 2878	x D. 2/31	6	3	...	25	25
D. 4/28	x D. 66/30	2	1	...	132	132
P.O.J. 2878	x S.C. 12 (4)	7	2	...	7	7
D. 82/30	x D. 66/30	3	8	124	467	591
P.O.J. 2878	x D. 7/30	3	...	...	...	...
D. 82/30	x Diamond 10	2	4	44	356	400
P.O.J. 2878	x D. 11/28	8	4	...	...	...
D. 602/22	x D. 66/30	4	2	14	50	64
P.O.J. 2878	x D. 4/28	3	1	...	10	10
D. 602/22	x Diamond 10	4	7	51	130	181
P.O.J. 2753	x Co. 281	1	2	...	...	...
D. 814/12	x Diamond 10	3	3	80	321	401
P.O.J. 2753	x P.R. 820	2	1	...	3	3
Co. 213	x D. 66/30	2	...	...	...	...
P.O.J. 1499	x "	9	4	...	29	29
M.P.R. 41	x Diamond 10	3	2	...	28	28
P.O.J. 2753	x Co. 213	1	...	...	...	...
D. 10/30	x Diamond 10	2	3	...	54	54
P.O.J. 1499	x Diamond 10	6	4	...	5	5
D. 154/28	x "	2	4	262	798	1,060
P.O.J. 1499	x S.C. 12 (4)	6	5	...	12	12
D. 13/30	x Diamond 10	2	3	257	716	973
P.O.J. 213	x D. 66/30	4	4	...	6	6
D. 7/30	x "	2	4	...	70	70
P.O.J. 2714	x "	3	2	...	20	20
Ba. 6835	x "	1	2	20	64	84
P.O.J. 2714	x Diamond 10	2	...	...	...	...
Ba. 6835	x "	1	2	...	25	25

Crosses.		No. of Arrows Used.	No. of Boxes Sown.	No. of Seedlings Basketed.		
Female.	Male.			With Pegasse.	With Clay.	Total.
D. 438/21	x Co. 213	4	2	...	80	80
D. 456/33	x Diamond 10	2	1	...	53	53
D. 438/21	x P. R. 820	2	3	...	87	87
D. 666/18	x S. C. 12 (4)	3	2	52	150	202
P. R. 820	x D. 438/21	3	6	...	109	109
D. 602/22	x S. C. 12 (4)	4	3	66	182	248
D. 438/21	x Co. 281	3	3	...	20	20
S. C. 12 (4)	x D. 66/30	3	4	...	104	104
M. P. R. 145	x Co. 281	4	7	...	6	6
D. 4/28	x Diamond 10	2	3	...	36	36
M. P. R. 145	x D. 438/21	2	4	...	...	...
D. 11/28	x D. 66/30	5	3	88	256	344
M. P. R. 145	x	1	1	...	...	...
P. O. J. 2878	x Co. 281	1	1	...	6	6
Red Ribbon (Sport)	x Diamond 10	3	8	...	21	21
M. P. R. 145	x	1	1	...	2	2
P. O. J. 2753	x D. 66/30	4	5	...	...	...
P. O. J. 2753	x Diamond 10	6	3	...	13	13
D. 456/33	x D. 66/30	2	2	...	65	65
P. O. J. 2727	x	4	1	...	52	52
"	x Diamond 10	3	4	15	65	80
D. 424/21	x D. 66/30	4	4	...	88	88
Ba. 6835	x S. C. 12 (4)	1	2	...	168	168
Bourbon	x Diamond 10	1	...	...	...	...
D. 83/17	x D. 66/30	1	1	...	16	16
D. 717/33	x	2	1	...	...	...
D. 83/17	x D. 666/18	1	1	...	...	...
P. O. J. 2878	x	6	1	...	...	...
D. 80/30	x D. 66/30	2	1	...	4	4
P. O. J. 2878	x D. 1/28	3	3	...	5	5
Ba. 6835	x D. 666/18	1	2	50	144	194
D. 83/17	x Diamond 10	1	1	...	...	...
Bourbon	x D. 666/18	1	...	...	...	...
D. 10/30	x D. 66/30	3	1	...	...	...
P. O. J. 2753	x S. C. 12 (4)	3	2	...	...	...
S. W. 3	x D. 66/30	1	1	...	...	...
D. 88/30	x	3	1	...	47	47
D. 171/29	x	3	5	...	436	436
D. 171/29	x Diamond 10	3	6	28	312	340
S. C. 12 (4)	x	6	6	...	4	4
D. 602/22	x D. 666/18	3	...	...	...	...
D. 424/21	x D. 11/28	4	2	...	3	3
D. 78/30	x D. 66/30	2	3	...	14	14
S. W. 3	x Diamond 10	1	1	...	14	14
D. 666/18	x D. 11/28	4	1	...	26	26
D. 88/30	x	3	3	...	...	...
D. 154/28	x D. 66/30	2	1	...	13	13
P. O. J. 2878	x D. 88/30	3	4	...	...	...
Diamond 10	x S. C. 12 (4)	3	1	...	228	228
D. 241/21	x Diamond 10	1	...	...	...	...
D. 47/30	x	2	1	...	6	6
D. 481/33	x D. 11/28	1	2	...	40	40
D. 481/33	x Diamond 10	1	2	...	8	8
M. P. R. 44	x S. C. 12 (4)	2	1	...	...	...
D. 710/35	x	2	4	...	56	56
D. 424/21	x Diamond 10	2	1	...	49	49
"	x S. C. 12 (4)	2	2	...	...	...
D. 78/30	x D. 11/28	1	3	...	12	12
"	x Diamond 10	2	...	...	...	...
"	x S. C. 12 (4)	1	...	...	...	...
Co. 210	x Diamond 10	2	3	...	...	...
D. 38/30	x D. 11/28	1	2	...	3	3
"	x D. 66/30	1	3	...	31	31
D. 1/28	x D. 11/28	1	...	...	4	4
D. 9/28	x D. 66/30	1	1	...	...	...
"	x D. 11/28	1	1	...	2	2
"	x D. 66/30	1	...	...	...	...
Co. 281	x Diamond 10	2	1	...	29	29
L. 88/30	x	2	...	...	...	...
"	x S. C. 12 (4)	2	2	...	70	70
P. O. J. 2727	x	2	1	...	...	...
P. O. J. 2714	x	3	...	...	...	...
P. O. J. 2878	x D. 438/21	2	2	...	4	4
D. 481/33	x D. 66/30	1	1	...	6	6
D. 66/30	x S. C. 12 (4)	2	2	18	50	68
D. 710/33	x D. 66/30	1	2	...	4	4
Total	149 Crosses	430	454	3,465	16,433	19,898

13. In addition to the canes listed in Table I and the varieties D. 625 and Diamond 10, the following introduced canes are now in replicated tests:—B. 417, B. 726, B. 755, Co. 210, Co. 213, Co. 281, F. C. 916, F. C. 998, G. 119, M. P. R. 44, M. P. R. 49, M. P. R. 145, M. P. R. 151, P. R. 803, P. R. 820, P. R. 826, P. O. J. 253, P. O. J. 2753, P. O. J. 2878, T. 1198, and T. 2020.

14. The following canes were received from the Central Quarantine Station,

Trinidad, and planted on December 21, 1935 :—B. 2931, B. 3011, B. 3013, B. 3124, B. 3138, B. 3216, B. 3234, B. 3439, Co. 290, C. P. 807, C. H. 64/21, Fiji, Groen Duitsch New Guinea, Kassoer, Kavangire, M. 28, Merthi, Mayaguez 42, Mayaguez 63, N. G. 251, Oshima, P. O. J. 2883, P. R. 803, Uba (India) and Uba (Naquin). This is an important collection which should prove very useful.

EXPERIMENTATION.

Experiments Reaped.

15. *Variety Trials*.—Of the twenty-six variety trials reaped during the year, ten were fully reported on in *Sugar Bulletin* No. 4. The remainder will be considered in detail in a later *Sugar Bulletin*. The varieties Diamond 10 and P. O. J. 2878 continue to show themselves markedly superior to the standard cane, D. 625, and planters are following the advice given to extend these two canes. A number of other Demerara and imported seedlings have given good results in the experiments. Such canes are now going through confirmatory tests prior to being definitely recommended. In the meantime there is an active demand for planting material of such canes as D. 11/28, D. 66/30 and Co. 213.

16. *Manurial Trials*.—Thirteen out of twenty-five manurial trials reaped have been fully dealt with in *Sugar Bulletin* No. 4. Another *Sugar Bulletin*, to be issued about July, will contain the results of the remainder. It is now established that the optimum doses of sulphate of ammonia for plant canes and first ratoons of D. 625 on the two main soil types are :—

	ON FLOOD-FALLOWED FRONTLAND.	ON PEGASSY AREAS.
Plant Canes of D.625	... 2 cwt. S. of A.	6 cwt. S. of A.
First Ratoons of D. 625	... 4 " " " "	6 " " " "

Evidence has been secured that Plant Canes of P.O.J. 2878 may profitably utilise 8 cwt. of sulphate of ammonia per acre on Pegassy areas, while first ratoons of the same variety on frontland soil may profitably use 6 cwt. per acre. Several estates have modified their fertiliser policy in accordance with the experimental results. This action is reflected in increased yields and increased fertiliser imports.

17. Four flood-fallowing experiments were reaped during the year. A discussion of the results will be found in *Sugar Bulletin* No. 4. The present indications are that :

Flood-fallowing is more advantageous than grass-fallowing on frontland soils ; The depth of water and the presence or absence of vegetation are not major factors in the yield of plant canes, though a recently reaped trial showed an effect of vegetable matter on the first ratoon crop ;

The addition of five tons of molasses per acre to the flood water may give an increased yield in the plant canes sufficient to pay for the molasses, and a residual increment in the first ratoons which would yield a satisfactory profit ;

A six-month flood-fallow gives about 12 per cent. increase over a four-month.

A twelve-month flood-fallow gives about 12 per cent. increase over a six-month.

18. Owing to upset labour conditions the plant canes of the Lime versus Limestone trials in Fields 45 O., Pln. Ogle and 14 Mont Rose West, Pln. La Bonne Intention, as well as the first ratoons of the variety trial in field 22 C. M., at the latter estate, had to be reaped unsampled and unweighed. Through an unfortunate error on the estate the manurial trial in Field 5 N. L. B. P., Pln. Cane Grove, had a similar fate.

Experiments in Progress.

19. During the year, twenty-nine variety, five manurial and one flood-fallowing trials were started. Table V lists the various experiments in progress, their

location, layout, etc. At the end of the year there were 48 variety, 25 manurial and 4 flood-fallowing trials in progress.

TABLE V.
LIST OF EXPERIMENTS IN PROGRESS ON DECEMBER 31, 1935.

Estate.	Field.	Kind of Experiment.	Treatments.	Replicates.	Age of Cycle.	Date Started or Reaped.	Layout.
BERBICE—							
Skeldon	8 S.	Manurial	4	4	1st Rat.	3.10.35	3 Lat. Sq.
"	7 E. & M.	"	4	4	2nd "	2.10.35	3 " "
"	8 E. & M.	"	4	4	"	1.10.35	3 " "
Port Mourant	13 R.	"	5	5	1st "	14. 3.35	" "
"	4 H.E.	"	4	4	2nd "	13. 2.35	" "
"	28 A.	Variety	6	6	"	3. 4.35	" "
"	15 A.O.L.	"	7	6	"	18. 4.35	Ran. Bks.
"	11 T.L.	"	9	6	1st "	23.10.35	" "
"	28 T.L.	Flood-fallow	4	4	"	27. 3.35	Lat. Sq.
"	28 T.W.	"	4	4	2nd "	14. 9.35	" "
Albion	31 K.	Manurial	5	5	1st "	17. 9.35	" "
Rose Hall	30 R.H.	"	4	4	2nd "	5. 3.35	" "
"	20 T.	"	5	5	1st "	12. 3.35	" "
Providence	14 E.W.	Variety	5	5	Plants	6. 6.35	" "
Blairmont	24 R.	"	6	6	1st Rat.	19.12.35	" "
"	71 B.L.	Manurial	5	5	"	10.10.35	" "
EAST DEMERARA—							
Cane Grove	53 M.	"	5	5	"	21. 5.35	" "
"	17 P.	Variety	7	7	Plants	14. 2.35	" "
"	5 N.B.P.	Manurial	5	5	"	3.11.34	" "
"	63 M.	"	5	5	1st Rat.	3. 5.35	" "
Enmore	15 B.A.	Variety	7	7	Plants	13. 2.35	" "
"	16 E.P.	Manurial	5	5	1st Rat.	2.10.35	" "
"	8 B.A.	"	4	4	2nd "	12. 2.35	" "
Lusignan	26 W.	"	4	4	"	21. 8.35	3 Lat. Sq.
"	76 A.	Variety	7	7	Plants	10. 7.35	1 " "
"	4 E.M.P.	Manurial	5	5	2nd Rat.	12. 2.35	" "
"	40 W.	Variety	7	7	Plants	10. 1.35	" "
"	85 M.R.	Manurial	4	4	2nd Rat.	27. 4.35	" "
"	F.	Flood-fallow	4	4	1st "	30. 4.35	" "
"	H.	"	4	4	"	"	" "
La Bonne Intention	22 C.M.	Variety	6	6	2nd Rat.	30.11.35	" "
"	44 M.R.	"	7	7	Plants	13. 6.35	" "
"	36 L.R.	"	7	7	"	1. 2.35	" "
"	14 M.W.	Manurial	5	5	"	30.11.35	" "
Ogle	109 E.	Variety	7	7	Plants	18. 9.35	" "
"	45 O.	Manurial	4	4	1st Rat.	23.10.35	3 " "
"	45 O.	"	5	5	"	23.10.35	1 " "
Sophia	2 K.	Variety	18	6	Plants	11. 6.35	Ran. Bks.
"	3 E. (A)	"	10	5	1st Rat.	13. 9.35	" "
"	3 E. (E)	"	10	5	"	13. 9.35	" "
"	5 E. (A)	"	5	5	Plants	10. 4.35	Lat. Sq.
"	5 E. (B)	"	5	5	"	10. 4.35	" "
"	5 E. (C)	"	5	5	"	10. 4.35	" "
"	5 E. (D)	"	5	5	"	10. 4.35	" "
"	5 E. (E)	"	8	5	"	19. 4.35	Ran. Bks.
"	8 E. (A)	"	10	7	"	17. 8.35	" "
"	8 E. (B)	"	10	7	"	17. 8.35	" "
"	9 E. (A)	"	11	5	"	4.12.35	" "
"	9 E. (B)	"	5	5	"	4.12.35	" "
"	9 E. (C)	"	6	5	"	11.12.35	" "
"	12 E. (A)	"	5	5	2nd Rat.	7.10.35	Lat. Sq.
"	3 W.	"	11	8	Plants	21. 6.35	Ran. Bks.
"	5 W.	"	6	5	1st Rat.	27.11.35	" "
"	6 W. (A)	"	6	6	"	15. 4.35	Lat. Sq.
"	6 W. (B)	"	6	6	"	15. 4.35	" "
"	7 W.	"	7	5	"	22.11.35	Ran. Bks.
"	8 W.	"	14	5	"	28.11.35	" "
"	9 W.	"	9	9	"	3.12.35	Lat. Sq.
"	10 W.	"	10	10	Plants	25. 1.35	" "
"	11 W. (A)	"	9	6	"	31. 5.35	Ran. Bks.
"	11 W. (B)	"	9	5	"	31. 5.35	" "
"	12 W.	"	10	10	"	17. 1.35	Lat. Sq.
"	13 W.	"	10	7	1st Rat.	17. 4.35	Ran. Bks.
"	15 W.	"	10	6	Plants	22. 5.35	" "
"	16 W.	"	9	7	2nd Rat.	1. 4.35	" "
Diamond	97 G.D.	"	7	7	Plants	14. 8.35	Lat. f q.
"	45 G.	"	7	7	"	24. 1.35	" "
WEST DEMERARA—							
Wales	4 B.	"	8	6	2nd Rat.	9. 4.35	Ran. Bks.
"	45 B.	"	7	7	Plants	18. 2.35	Lat. Sq.
"	9 C.	Manurial	5	5	1st Rat.	16. 3.35	" "
Versailles	31 R.D.Z.	"	5	5	2nd "	13. 3.35	" "
Leonora	16 G.V.	Variety	7	7	Plants	25. 9.35	" "
"	N.E.A.C.I.	Manurial	5	5	"	19.10.34	" "
Uitvlugt	33 E.	"	5	5	1st Rat.	11. 9.35	" "
"	14 Z.	"	4	4	2nd "	5. 3.35	" "
"	46 De W.	Variety	7	7	Plants	19. 9.35	" "
"	42 W.	"	7	7	"	17. 1.35	" "

20. Table VI summarises, for each variety, the number of experiments in which it occurs and their cycle ages.

TABLE VI.
VARIETIES IN REPLICATED TESTS, DECEMBER, 1935.

Variety.	Number of Experiments as			Total.	Variety.	Number of Experiments as			Total.
	Plants.	1st. Rat.	2nd Rat.			Plants.	1st. Rat.	2nd Rat.	
B. 417	...	1	...	1	D. 69/29	...	1	...	1
B. 726	...	1	...	2	D. 75/29	...	1	...	1
B. 755	...	1	...	2	D. 76/29	...	1	...	2
Co. 210	...	...	1	1	D. 140/29	...	1	...	1
Co. 213	...	6	...	7	D. 163/29	...	1	...	1
Co. 281	...	...	1	1	D. 171/29	...	3	...	3
D. 625	...	9	10	25	D. 178/29	...	...	1	1
Diamond 10	...	14	4	20	D. 180/29	...	1	...	1
F.C. 916	...	1	...	1	D. 183/29	...	1	...	1
F.C. 998	...	1	...	1	D. 184/29	...	1	...	1
G. 119	...	3	1	4	D. 2/30	...	6	1	7
M.P.R. 44	...	2	...	2	D. 6/30	...	1	...	1
M.P.R. 49	...	1	...	1	D. 7/30	...	5	1	6
M.P.R. 145	...	1	...	1	D. 10/30	...	1	1	2
M.P.R. 151	...	3	...	3	D. 13/30	...	3	1	4
P.R. 803	...	1	...	1	D. 14/30	...	...	1	1
P.R. 820	...	2	1	3	D. 19/30	...	...	1	4
P.R. 826	...	3	...	3	D. 24/30	...	4	...	1
P.O.J. 253	...	...	1	1	D. 31/30	...	...	1	1
P.O.J. 2753	...	1	...	1	D. 38/30	...	1	...	2
P.O.J. 2878	...	11	6	19	D. 39/30	...	2	...	1
T. 1198	...	2	1	3	D. 43/30	...	...	1	1
T. 2020	...	3	...	3	D. 45/30	...	...	1	1
D. 814/12	...	...	2	2	D. 46/30	...	2	1	3
D. 747/13	...	3	...	3	D. 47/30	...	4	1	5
D. 73/17	...	...	1	1	D. 48/30	...	2	...	2
D. 83/17	...	2	...	2	D. 49/30	...	10	...	10
D. 92/17	...	...	1	2	D. 50/30	...	2	1	3
D. 195/17	...	2	1	3	D. 51/30	...	3	...	3
D. 404/17	...	3	...	3	D. 52/30	...	1	...	1
D. 666/18	...	...	1	1	D. 54/30	...	...	1	1
D. 52/20	...	3	2	5	D. 60/30	...	3	...	3
D. 203/20	...	2	1	4	D. 62/30	...	1	1	2
D. 207/20	...	1	...	2	D. 63/30	...	1	1	2
D. 349/20	...	...	1	1	D. 64/30	...	1	2	3
D. 682/20	...	...	1	1	D. 66/30	...	5	1	6
D. 6/21	...	...	2	2	D. 67/30	...	2	...	2
D. 206/21	...	...	1	1	D. 71/30	...	1	...	1
D. 241/21	...	3	1	4	D. 73/30	...	2	...	2
D. 309/21	...	1	1	3	D. 74/30	...	2	...	2
D. 426/21	...	2	...	2	D. 75/30	...	2	...	1
D. 438/21	...	...	1	1	D. 78/30	...	1	...	2
D. 444/21	...	1	...	2	D. 79/30	...	2	...	1
D. 548/21	...	2	...	2	D. 81/30	...	1	...	2
D. 628/21	...	2	1	4	D. 84/30	...	2	...	2
D. 684/21	...	...	2	2	D. 88/30	...	2	...	2
D. 573/22	...	1	...	3	D. 103/30	...	2	...	2
D. 895/22	...	...	2	3	D. 113/30	...	2	...	2
D. 927/22	...	3	1	4	D. 135/30	...	3	...	3
D. 1159/22	...	...	2	2	D. 136/30	...	1	1	2
D. 36/23	...	1	...	1	D. 147/30	...	1	...	1
D. 11/24	...	1	...	2	D. 150/30	...	2	...	2
D. 57/27	...	4	...	4	D. 151/30	...	2	...	2
D. 87/27	...	2	...	2	D. 164/30	...	2	...	1
D. 134/27	...	2	1	3	D. 165/30	...	1	...	1
D. 284/27	...	1	...	1	D. 167/30	...	1	...	3
D. 1/28	...	3	2	5	D. 170/30	...	3	...	2
D. 4/28	...	1	2	4	D. 173/30	...	2	...	1
D. 9/28	...	3	1	5	D. 178/30	...	1	...	1
D. 10/28	...	...	1	1	D. 179/30	...	...	1	3
D. 11/28	...	2	3	7	D. 182/30	...	3	...	2
D. 15/28	...	...	1	1	D. 205/30	...	2	...	8
D. 22/28	...	1	...	1	D. 215/30	...	1	1	3
D. 23/28	...	...	1	2	D. 218/30	...	6	...	3
D. 30/28	...	...	1	1	D. 219/30	...	2	1	3
D. 50/28	...	...	1	1	D. 232/30	...	3	...	2
D. 164/28	...	2	2	4	D. 235/30	...	2	...	1
D. 2/29	...	1	...	2	D. 1/31	...	1	...	1
D. 16/29	...	...	1	1	D. 2/31	...	1	...	1
D. 18/29	...	2	1	3	D. 11/32	...	1	...	1

MISCELLANEOUS.

21. Table VII gives the statistics, for recent years, as to the annual expenditure of the Station, seedlings bred, field experiments started and reaped, cane distribution, cane samples analysed and their weight, soil and root samples taken, cane sold and visits paid to estates.

TABLE VII.
STATISTICS OF EXPENDITURE, SEEDLINGS, FIELD EXPERIMENTS, PLANT DISTRIBUTION, CANE, SOIL AND ROOT SAMPLES, CANE SOLD AND VISITS PAID TO ESTATES 1929-1935.

Year.	Expenditure from*				Seedlings Basketed.	Field Experiments		Cane Cuttings distributed.		Cane Samples.		Soil Samples taken.	Root Samples taken.	Cane sold to Pln. Ogle.		No of days visiting Estates.
	Sugar Experiments Cess.	Imperial Grants.	Other Sources.	Total.		Started.	Harvested.	No. of Cuttings.	No. of Bags.	No. taken and analysed.	Cane crushed Tons.			Punt loads delivered.	Net Receipts.	
	\$	\$	\$	\$											\$	
1929	15,667.26	...	...	15,667.26	6,100	3	7	119,600	920	2,200	25	50	...	63	1,099.55	18
1930	16,950.71	...	...	16,950.71	9,235	17	1	259,740	1,993	36	1	62	...	54	296.09	90
1931	17,736.66	2,923.70	...	20,660.36	4,240	17	17	388,700	2,990	731	16	136	...	313	1,444.56	151
1932	17,136.17	2,107.94	...	19,244.11	5,291	27	34	395,720	3,044	1,134	34	112	...	542	2,974.55	135
1933	18,209.79	4,065.27	1,330.27	23,605.33	18,974	30	47	174,590	1,343	2,490	52	175	1,272	599	3,635.68	259
1934	18,133.67	4,057.22	2,095.08	24,285.97	24,147	30	58	39,978	307	2,425	53	400	560	380	2,767.31	197
1935	24,295.44	4,139.87	2,250.38	30,685.69	19,898	34	55	486,200	3,740	2,719	50	310	...	521	3,720.52	212

* For Field Experimentation, Cane Breeding, etc. Does not include expenditure on Entomological Investigations.

22. *Cane Fluff* of the following crosses and selfs was sent to the Estacion Experimental Agricola de Tucuman, Argentina.

Crosses or Selfs.				No. of Boxes.
P.O.J. 1499	x	D. 66/30	...	2
P.O.J. 213	x	"	...	1
Co. 213	x	"	...	1
P.O.J. 2714	x	"	...	2
Co. 281	x	"	...	1
P.O.J. 2727	x	"	...	1
P.O.J. 2753	x	"	...	1
P.O.J. 2878	x	"	...	2
Co. 213	x	"	...	1
Co. 281	(Self)	Diamond 10	...	2
P.O.J. 2714	(,,)	"	...	3
P.O.J. 2725	(,,)	"	...	2
P.O.J. 213	(,,)	"	...	1
Total				20

23. *Cane Cuttings* of the varieties D. 66/30, D. 49/30 and D. 625 were sent to the Central Quarantine Station at Trinidad.

24. *Publications.*—*Sugar Bulletin* No. 4 was issued during the year, the Agronomist, Chemist and Field Manager collaborating in its preparation. The Agronomist contributed to *The Agricultural Journal of British Guiana* (Volume VI. No. 1) "Commercial Results from Cane Seedlings," and (Volume VI. Nos. 2 and 3) "The Variety and Fertiliser Position of the Sugar Industry." Several notes have been prepared for distribution to the local press, and monthly and half-yearly progress reports regularly submitted.

25. *Rainfall*.—Table VIII compares the 1935 monthly rainfall at Sophia Sugar Experiment Station with the monthly average for the 15 year period 1921–1935.

TABLE VIII.

COMPARISON OF THE RAINFALL AT SOPHIA FOR THE YEAR 1935 WITH THE AVERAGE.

Month.				1935, Inches.	Average 1921–35, Inches.
January	...	...	...	5.91	8.69
February	...	...	...	11.15	3.97
March	...	...	...	3.80	4.02
April	...	...	...	1.46	4.64
May	...	...	...	12.71	11.49
June	...	...	...	14.00	14.12
July	...	...	...	8.94	10.55
August	...	...	...	11.71	8.52
September	...	...	...	5.30	2.81
October	...	...	...	4.22	3.96
November	...	...	...	4.34	5.89
December	...	...	...	4.36	14.11
Total				87.90	92.77

It will be seen that the 1935 rainfall was 4.87 in. below the normal. Any disadvantages due to this were offset by the satisfactory distribution of the precipitation.

26. The writer desires to thank the Managers and Staffs of the sugar estates for their many courtesies to the Sugar Experiment Stations' Staff, and to record his appreciation of the co-operation and assistance received from his colleagues.

C. HOLMAN B. WILLIAMS,
Sugar Agronomist.

January 31, 1936.

DEPARTMENT OF AGRICULTURE.

REPORT ON THE CHEMICAL DIVISION FOR THE YEAR 1935.

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REPORT ON THE CHEMICAL DIVISION FOR THE YEAR 1935.

STAFF.

R. R. Follett-Smith, B.Sc., A.R.C.S.—Chemist-Ecologist.
C. L. C. Bourne —Assistant Chemist.

GENERAL.

2. The Chemist, who had been on tour in the Rupununi District in connection with proposed Assyrian settlement since October 18, 1934, returned to Georgetown on January 18, 1935. The Chemist was granted leave of absence from April 30 to November 7. During this period he represented the Government of British Guiana at the Third Conference of the International Society of Soil Science held at Oxford and subsequently proceeded on the post-congress tour.

3. The number of samples examined during the year has decreased slightly for reasons put forward in the previous report. The Division has ceased to receive assistance from supernumerary staff hitherto employed as a result of the receipt of grants from the Colonial Development Fund, Imperial Chemical Industries, Ltd. and Messrs. Booker Bros., McConnell & Co., Ltd. Experimental work has tended away from the laboratory and the assistants are now engaged in the execution of fertilisers trials, irrigation and growth experiments. Mr. J. F. Williams, who had been working for three and a half years in the laboratory as soil chemist to Messrs. Booker Bros., McConnell & Co., Ltd., was transferred, in February, to Berbice. Mr. Williams has been appointed chemist to the estates of Port Mourant, Rose Hall and Skeldon in succession to the late Mr. Maurice Bird. Prior to his departure Mr. Williams was investigating the changes occurring in calcium cyanamide stored under humid tropical conditions. Since Mr. Williams' departure arrangements were made with Messrs. Booker Bros., McConnell & Co., Ltd., to employ Messrs. L. A. Robinson, J. M. Smith and A. Stevenson on special work in connection with the soils of their estates. Under these circumstances the effective Government staff on duty during the major part of the year consisted of the Assistant Chemist and two laboratory assistants.

4. The work of the Division has consisted of advisory work in connection with the soils of the coastal belt and of the interior. It has also been concerned with the chemistry of crop production. During the year the Chemist was consulted by a sugar firm as to the factory results obtained on their estates. Some time has been devoted to the laboratory examination of certain aspects of the problem of flood-following and determinations of the index of hardness of a large number of composite samples of sugar-cane soils have been completed. A considerable amount of time has been devoted to the design of field experiments with sugar-cane and the statistical treatment of the results obtained. Towards the end of the year a large scale factory trial of sodium aluminate as a clarification aid for cane sugar juices were undertaken by one of the Colony's estates. Mr. L. A. Robinson was seconded for a fortnight to conduct special analyses of factory products during the trial.

5. Soil samples, obtained from the Pakaraima Range, indicate that there are isolated patches of exceptionally fertile soil distributed in the area. Examination of the samples of pasturage and soil collected during the reconnaissance survey of the Rupununi District and the Pakaraima Mountains was completed during the early part of the year and formed the basis of a report which subsequently appeared in the *Agricultural Journal* VI. 4, pp. 155-184.

6. The pineapple canning industry continued to receive assistance from the Division in regard to the examination of fruit from the various plots of the fertiliser

experiment. In addition a pot experiment concerned with the uptake of nutrients by pineapple plants was completed during the year.

7. Following the interesting work in Trinidad on the manurial requirements of grapefruit a certain amount of preliminary work was carried out in connection with the grapefruit cultivation at Hosororo Experiment Station, North West District. The results obtained supported the conclusions reached in Trinidad and modifications are being made in the manurial applications to various trees for demonstration purposes.

8. Work was commenced on the isolation and estimation of the insecticidal substances contained in local fish poisons. Root samples of the Haiaris (*Lonchocarpus Nicou*) have been examined and the technique for their analysis is being acquired.

EXAMINATION OF SAMPLES.

9. The following samples have been examined during the year :—

TABLE I.

Soils	...	...	476
Sugar-canes	...	...	2,719
Seedling cane juices	...	...	55
Pineapples	...	...	56
Forage crops	...	...	10
Fertilisers	...	...	7
Grapefruit leaves...	...	...	2
Grapefruit	...	...	2
Miscellaneous samples	...	...	16

The miscellaneous heading includes samples of resin, waters, wines, factory scale, sludges from a water purification plant, molasses and fermented wash.

10. The number of samples examined by the Division during the last six years is shown in Table II.

TABLE II.

	1930	1931	1932	1933	1934	1935
Soil samples	649	436	362	527	583	476
Sugar-cane samples	71	793	1,134	2,490	2,736	2,774
Other samples	54	116	20	107	128	93

The number of soil examples reported in this table does not include the 448 samples collected and examined in this laboratory by Mr. L. A. Robinson and his helpers. As foreshadowed in the previous report the number of soil samples collected for examination has decreased. The work of the Division now consists of a more detailed examination of fewer soils. A considerable amount of time was devoted to the analyses of soils from sugar estates for advisory purposes. Very few advisory visits were paid to estates owing to the depletion of staff during the greater part of the year.

SOIL INVESTIGATIONS.

11. In Para. 13 of the previous report a description was given of a blight affecting a plant cane field of D. 625. It was suggested that it was possibly connected with the lack of some minor element which is rendered available by flooding. While attending the International Soil Congress the Chemist described this occurrence to another member who kindly offered to examine samples of blighted and unblighted leaves for trace elements by means of a spectrograph.

12. *Flood Following*.—In para. 19 of the previous report the distribution of "available" iron and manganese in successive small layers of soil flooded for four

months was described. Other samples of the same soils were submerged for a period of twelve months with the following results.

TABLE III.
"AVAILABLE" IRON, MGM. EQS. /100 GM. SOIL.

Depth of layers.		Clay topsoil, Demerara.	Clay topsoil, Berbice.
0"	— 0.3"	12.1	25.6
0.3"	— 0.7"	31.2	8.5
0.7"	— 1.1"	37.6	15.7
1.1"	— 1.5"	40.8	17.0
1.5"	— 1.9"	44.4	19.6

In the Demerara clay the amount and distribution of "available" iron is very similar to that obtained after four months submergence. In the Berbice clay there is less "available" iron, as was the case in the previous experiment. The two top layers of soil submerged for twelve months together contain a similar amount of "available" iron to that found after four months submergence but it appears that "available" iron has been concentrated in the top layer at the expense of the second layer. The upper layers of both soils possessed the red-brown colour noted in the previous experiment. In the Demerara clay the scum covering the surface of the soil contained no apparent living vegetable matter, that from the Berbice clay contained some Blue Green algae.

13. The laboratory work carried out by the Division on the subject of flood-fallowing now forms the basis of a reasonable explanation of the beneficial effects of this procedure.

Planters have recognised for a number of years that flood-fallowing is responsible for an increase in subsequent yields, for an improved tilth and for a change in soil colour to a reddish tinge.

14. The work of the Division suggests that the main reason for increased yields is the very marked improvement in the soil texture. Such an improvement in the tilth of the heavy clay soils of the Colony permits of freer movements of water and air through the soil thus permitting more microbiological activity and furnishing larger supplies of plant nutrients. It improves drainage and encourages the development of an adequate root system.

15. The results of laboratory work described in the previous report, paras. 14-21, indicate that the main chemical change occurring in the soil as a result of flood-fallowing is a marked increase in the amount of "available" iron in both the top foot and the second foot. When soil is submerged considerable amounts of ferrous iron are formed and permeate the clay. It is probable, when the flooding water drains away and air gains access to the soil, that particles of clay become coated with iron oxide and that these coatings of iron oxide confer an improved tilth on the soil. After a period of cropping the coatings of iron oxide disappear, the clay tends to run together and the soil loses its texture. A further period of flooding is required to restore fertility.

Fields of pegasse are seldom flood-fallowed since it is difficult to retain water in fields of such porous soil. Little response has been obtained in the few pegasse fields which have been flood-fallowed experimentally. Pegasse soil is naturally light in texture and flood-fallowing causes no improvement.

16. It is understood that the management of Pln. Skeldon regularly plough their land after flood-fallowing. Such a procedure would facilitate the oxidation of the soil and the formation of coatings of iron oxide with a consequent further improvement of tilth. It is possible that the large increases in yield recently obtained by Pln. Skeldon may, in some measure, be due to this practice of ploughing flood-fallowed land, a method of which they are the pioneers.

17. The above explanation of the beneficial effects of flood-fallowing fits the field and laboratory observations but the existence of coatings of iron oxide round the soil particles is not easily proved by direct experiment. There are other points which require investigation. It has been noted that acetic acid extracts of flooded soils contain more silica and the implications arising from this observation require examination. It is proposed to investigate the soil texture, by means of Keen's sieves, of the plots of a flooding experiment which was submerged two years previously in order to see to what extent the original improvement in texture has been maintained and to attempt a correlation between crop yields and tilth.

18. Composite samples of topsoil and subsoil were collected from each of the thirty-two plots of this experiment immediately after the water was released. The results of their laboratory examination were given in the previous report. The plant cane crop was reaped during the year under review (*Sugar Bull.* No. 4, pp. 96-104) and it has been possible to trace the connection between the weight of plant cane produced and the amount of "available" iron present in the soil at planting. The correlation coefficient between tonnage of plant cane and "available" iron in the topsoil is $r = +0.4550$ ($P = 0.01$) while that between tonnage and "available" iron in the subsoil is $r = +0.3868$ ($P = 0.05$). The factors affecting the yield of cane are so diverse that a high correlation between the results of analysis of soil samples taken before planting and the final yields of cane is not to be expected. The correlation between "available" iron content of the topsoil and tonnage of plant cane is very definitely established. The connection is, however, not close.

19. To summarise the information obtained regarding flood-fallowing it may be said that field experiments indicate that, as far as the plant cane crop is concerned, the practice has a definite and beneficial effect upon the yield of cane and that this effect is enhanced as the duration of the flooding is prolonged, at least up to twelve months. There is no difference in yield from flood-fallowed plots limed before flooding or limed just before planting. The depth of flooding water has no effect on the yield. Sowing water plants has a beneficial effect on the first ratoon yield while the addition to the flooding water of final molasses at the rate of five tons per acre appears to be an economic proposition. The laboratory work indicates that flood-fallowing usually eliminates injurious salts from the soil, in some cases the organic matter content of the soil is decreased. Submergence is followed by an immediate increase of the exchangeable ammonium content of the soil. The *main* beneficial effect of flood-fallowing appears to be an improvement in soil texture consequent upon an increase in the "available" iron content of the soil.

20. *Crumb Hardness.*—In the previous report (paras. 18 and 22) determinations of crumb hardness were reported and it was shown that the value obtained increased with the soil content of water-soluble salts and of exchangeable and water-soluble soda and decreased with the soil content of water-soluble and exchangeable lime. Determinations were made on one hundred composite soil samples from the Colony's sugar estates. The mean values for acidity and texture classes of the three counties is given in Table IV and V.

TABLE IV.
CRUMB HARDNESS. TOPSOILS.

Index of Texture.	East Coast, Demerara.		West Coast, Demerara	Berbice.	
	Exchange pH. 3.00-3.99 4.00-4.99.		Exchange pH. 3.00-3.99.	Exchange pH. 3.00-3.99 4.00-4.99.	
41 — 45	28	...	...	...	79
46 — 55	20	79	9	50	81
56 — 65	1	...	0	...	...
 65	...	...	0	...	...

TABLE V.
CRUMB HARDNESS. SUBSOILS.

Index of Texture.	East Coast, Demerara.		West Coast, Demerara.	Berbice.	
	Exchange pH. 3.00-3.99 4.00-4.99		Exchange pH. 3.00-3.99	Exchange pH. 4.00-4.99 5.00-5.99	
45 — 55	33	93	20	95	96
56 — 65	1	...	0	...	...

All the soils with a texture above 56 were highly acidic pegasses and, as to be expected, their crumb hardness values are extremely low. The subsoils possess higher values than topsoils due, probably, to their higher contents of soluble salts. It is not surprising that the less acidic soils possess higher values since the less acid soils usually contain more soluble salts. Comparing similar texture and acidity classes it appears that the soils of West Demerara have a much lower crumb hardness than those of East Demerara and Berbice. Little difference is to be noted between the cane soils of the two latter counties.

Soils of the Interior.

21. During the year a reconnaissance survey of the Rupununi District and the Pakaraima Range was completed and an abridged report was published in the *Agricultural Journal* VI. No. 4 pp. 154-184. The greater part of the area presents no agricultural possibilities and few signs of cultivation are to be seen. At present farming is conducted under a system of shifting cultivation in forested areas while certain crops are produced in disused cattle corrals. There are a few limited areas of good agricultural soil which would support continuous cultivation, but even on these areas the farmers does no weeding or forking and finds it simpler to clear a fresh area of bush rather than keep his original cultivation clean. It is interesting to note that the areas of good agricultural soil encountered always occurred in the foothills and valleys of mountain slopes of northern or north-western aspect. Such areas are to be found in the Kanaku Mountains, the Kusad Mountains, the Shiriri Mountains, the mountains of the Kurasabi Reserve and possibly the Annai Hills. The greater part of the Pakaraima Range appears to be unsuited to permanent agriculture. There are, however, isolated patches of exceptionally fertile soil. Two samples from one such area in the wide valley of the Yawong between Wandapatoi and Pakamakatoi gave the analytical results shown in Table VI.

TABLE VI.

	E. 377.	E. 378.
Normal reaction pH ...	8.33	8.06
Exchange reaction, KCl pH ...	7.97	7.99
Soluble salts % ...	0.051	0.052
Organic matter % ...	3.22	3.63
Nitrogen % ...	0.256	0.288
Carbon : nitrogen ratio ...	7.25	7.25
Readily available phosphate, p.p.m. ...	72	10
Index of texture ...	38	41
Rate of solution ...	265	280
Exchangeable bases		
Lime ...	20.94	13.33
Magnesia ...	2.65	3.58
Potash ...	0.20	0.34
Soda ...	0.12	0.21

The clay fraction from sample E. 377 was analysed with the following results.

TABLE VII.
PER CENT. OVEN DRY SOIL.

Silica (SiO_2) ...	...	36.47
Iron oxide (Fe_2O_3) ...	...	12.18
Titanium dioxide (TiO_2)..	...	0.45
Alumina (Al_2O_3) ...	...	35.18
Manganese dioxide (MnO_2)	...	nil
$\text{SiO}_2/\text{R}_2\text{O}_3$...	...	1.44
$\text{SiO}_2/\text{Al}_2\text{O}_3$...	...	1.76
$\text{SiO}_2/\text{Fe}_2\text{O}_3$...	...	7.95

Both samples were alkaline chocolate brown silts. Excellent crops were being obtained in this area.

A similar sample of soil from Kapuitipu on the Kamarang River, a tributary of the Mazaruni River, was submitted for examination during the year. It was reported to bear good crops.

MANURIAL TRIALS.

22. The main object of the manurial trials with sugar-cane has been the determination of the nitrogen requirements of plant and ratoon crops of the three main cane varieties of the Colony, *i.e.* D. 625, P.O.J. 2878 and Diamond 10. The general position regarding the results of these trials has been summarised in *Sugar Bulletin* No. 4 published during the year. The nitrogen requirements of the different varieties vary considerably and many more field experiments distributed throughout the Colony's sugar-cane lands are required before definite recommendations can be given under all circumstances. While main generalisations can be stated yet the complexity of the problem can be understood when it is found that plant canes of variety P.O.J. 2878, growing on very fertile soil, did not require applications of sulphate of ammonia, in fact, such applications had an adverse effect on the sucrose content and the ripening of the cane. A further example of inconsistency is given by a field trial with first ratoons of Diamond 10. Usually there is an economic response to four or more cwt. per acre of sulphate of ammonia under these conditions but the results of this particular trial indicate that the maximum economic dose is at the rate of 2 cwt. per acre. The variety Diamond 10 appears to be best suited to the river estates and to the West Coast of Demerara and the peculiar results obtained in the trial under discussion may possibly be due, in part, to the fact that the experiment was made in Berbice. The results obtained with plant canes of variety D. 625 at five centres (*Sugar Bull.* No. 3 pp. 79-84) were so variable that although two cwt. per acre of sulphate of ammonia appeared to be generally desirable yet a certain amount of latitude is required in making a decision.

An important secondary problem of the manurial needs of sugar-cane is the matter of phosphate requirements. Detailed soil surveys have indicated that there are large areas of phosphate-deficient soils in Berbice and a series of field trials has been conducted in this connection. The results of these six experiments have followed expectations based on the chemical analyses of samples of soil withdrawn from experimental areas. The tentative limits for phosphate content of soil so far used in advisory work are shown in Table VIII.

TABLE VIII.
PHOSPHATE CONTENT, PARTS PER MILLION.

			Tru'g method.	1% citric acid solution.
Deficient	...	...	Below 16	Below 50
Doubtful	...	...	16-22	50-70
Sufficient	...	...	Above 22	Above 70

The results obtained in the field trials are compared in Table IX with the results of chemical analyses of the plot samples.

TABLE IX.

Field.			Truog method.	Citric acid method.	Result of experiment.
Rose Hall, T. L. 19, 20	...	Topsoil	Deficient	Deficient	Indefinite.
		Subsoil	Sufficient	Deficient	
Blairmont, H. P. 15	...	Topsoil	Sufficient	Sufficient	No increase in weight.
		Subsoil	Deficient	Deficient	Improved quality.
Cane Grove, 51 M.	...	Topsoil	Deficient	Deficient	Definite increase.
		Subsoil	Deficient	Deficient	
Port Mourant, 13 R.	...	Topsoil	Doubtful	Sufficient	No effect.
		Subsoil	Doubtful	Deficient	
Rose Hall, T. 20	...	Topsoil	Doubtful	Deficient	No effect.
		Subsoil	Doubtful	Deficient	
Cane Grove, 53 M.	...	Topsoil	Deficient	Deficient	Definite increase.
		Subsoil	Deficient	Deficient	

The results suggested that the Truog method gives a better indication of the phosphate requirements of the Colony's cane soils than does the 1% citric acid method. Many further field experiments are required before the phosphate question is placed upon a satisfactory basis. There are indications that Nicifos gives higher yields than equivalent mixtures of sulphate of ammonia and superphosphate or basic slag. The magnitude of the economic dressing of phosphate fertiliser also needs further investigation.

During the year field trials with cyanamide in comparison with sulphate of ammonia have been established. The results are shortly to be published. Storage trials with cyanamide have been carried out by Mr. J. F. Williams and there are indications that deterioration occurs rapidly in humid tropical conditions. The results of this investigation will appear shortly.

The general question of the efficacy of liming the sugar-cane soils of the Colony has received considerable attention in previous years. On the frontland clays, dressings of slaked lime or ground limestone had such small effects on yield that the differences were undetectable by ordinary experimentation. No indication as to the source of lime was obtained from the field trials. It was decided, however, that small dressings at the rate of $\frac{1}{2}$ –1 ton per acre should be made at the beginning of each cycle to form an insurance against the tendency of the soils towards increasing acidity. There has been a feeling among the planters that experiments of greater precision should be established to determine the effect on yield of small dressings of lime and also to decide whether ground limestone or slaked lime was to be desired as a source. The results of these experiments will shortly be reported.

When the present series of fertiliser experiments, embodying recent statistical methods, were commenced it was felt that experiments involving combinations containing nitrogen, phosphate and potash at different levels should be established on clay and on peggasse soils. With the original methods of experimental design such trials required so large a number of plots that great difficulty was experienced when sugar-cane was the indicator plant. By employing the principles of confounding, the layout of such trials has been much simplified and four of these experiments are being established.

The increasing use of irrigation during recent years has required the investigation of the effect of different intensities of irrigation on the nitrogen requirements of the sugar-cane. A large scale experiment, embracing five estates, has been designed to examine this problem. The trial is in the process of establishment.

There is no doubt that much useful information could be gained if the more promising new cane seedlings were tested, as a matter of general routine, in field

trials designed to assess their response to varied applications of sulphate of ammonia. Such tests can be easily executed by means of the split plot or strip modifications of Fisher's methods.

Sir John Harrison (*West Indian Bulletin* V. p. 337) in describing his methods of selection states:

"*Seventh selection.* During the course of the fifth and sixth selections "several of the varieties finally retained in cultivation will have been "selected by planters by large-scale cultivation. These and a few others "selected by ourselves are next examined by means of manurial "experiments. Plots of about $\frac{1}{2}$ acre are divided into smaller plots, and "upon these the varieties are raised under varying systems of manuring. "Some of the plots of every kind are manured with phosphates, and "perhaps potash, others are not. Some of each are grown without any "nitrogenous manures, others with increasing quantities of nitrogen. It "has been found that the mean results of a kind under the varying kinds "of manuring apparently offer the most reliable figures as to comparative "value we can obtain on small-scale experiments."

At a later date (*West Indian Bulletin* IX. p. 18) he says:

"My experience is that by growing varieties of sugar-cane under "several different systems of manuring, as I have done in the experiments "with regard to the manurial requirements of the newer varieties of "sugar-cane, and by taking the means of the results produced by a variety "with the different manures applied to it, more reliable indications of the "probable relative values of varieties when cultivated on large scales "are obtainable than when the results of cultivation with one system of "manuring only are considered."

In 1913 (*West Indian Bulletin* XIII. p. 181) he states:

"As pointed out previously, one of the earlier symptoms of 'running out,' " 'falling off,' or 'degeneration' was a reduction in its capacity for "responding to treatment with nitrogenous manure."

It would appear, therefore, than an expression of the capabilities of new varieties to respond to applications of sulphate of ammonia may be of considerable use in the work of selection.

23. The Division has been consulted during the year regarding the design of fertiliser trials with padi. The results of these experiments will be found in the report of the Plant Breeder. The application of artificial fertilisers to padi in the Colony is, with present prices, an academic problem. Even spectacular increases prove uneconomic.

OTHER INVESTIGATIONS.

Pineapples.

24. During the period under review the pot experiment with Smooth Cayenne pineapples (see previous report, paras. 38-39) has been completed. The contents of Table X. and XI. form a continuation of Tables XXIV. and XXV. in the previous report.

TABLE X.
ASH CONSTITUENTS PER CENT. OVEN DRY WEIGHT.

Date of collection.	1. 3. 35.		4. 6. 35.	
	Leaves.	Roots.	Leaves.	Roots.
Total Ash (Sulphated) ...	9.42	28.78	9.34	33.45
Silica-free ash ...	7.50	2.41	7.75	2.90
Nitrogen (N) ...	0.64	0.42	0.70	0.42
Silica (SiO ₂) ...	1.92	24.37	1.59	30.56
Phosphate (P ₂ O ₅) ...	0.42	0.08	0.67	0.07
Potash (K ₂ O) ...	2.88	0.43	2.97	0.42
Magnesia (MgO) ...	0.52	0.16	0.52	0.16
Lime (CaO) ...	0.71	0.45	0.72	0.66
Iron and alumina, etc. ...	0.14	0.11	0.18	0.20

TABLE XI.
GMS. CONSTITUENTS PER HUNDRED FRESH PLANTS.

Date of collection.	1. 3. 35.		4. 6. 35.		Fruit.
	Leaves.	Roots.	Leaves.	Roots.	
Total Ash (Sulphated)	4,182	1,753	4,230	2,943	965
Silica-free ash	3,310	154	3,439	250	837
Nitrogen (N)	281	27.6	313	35.9	79.5
Silica (SiO_2)	873	1,600	742	2,693	62.1
Phosphate (P_2O_5)	181.5	5.0	302	5.8	41.9
Potash (K_2O)	1,273	26.9	1,337	35.9	297
Magnesia (MgO)	223	9.7	234	14.0	50.6
Lime (CaO)	314	29.1	323	56.7	173.4
Iron and alumina, etc.	63.4	7.1	80.8	17.9	13.5
Fresh wt. of one plant, gms.	3,252		3,892		...

The uptake of nitrogen, potash and phosphate stated as pounds per acre, with 10,000 plants to the acre, is shown in Table XII. which forms a continuation of Table XXVI. in the previous report.

TABLE XII.
UPTAKE OF PLANT FOODS, LB. PER ACRE.

Date of sampling.	1. 3. 35.	4. 6. 35.
Nitrogen (N)	63	94
Potash (K_2O)	287	368
Phosphate (P_2O_5)	41	79

25. Both the growth rate and the nutrient uptake are very small during the first three months and even between the ages of three months and six months the growth rate is small. At six months of age the plants enter upon a period of rapid growth which tends to slow up as the flowering stage is reached at fifteen months. Further considerable increases are observed while the fruit is being formed.

The experiments were conducted in pots using wallaba sand, typical of the local pineapple plantation, receiving adequate amounts of plant nutrients. The soil itself can make very little contribution to the plant food supply, being a coarse sand consisting of about 98 per cent. silica and 2 per cent. of organic matter.

The results of the experiment suggest that fertiliser applications should not be made to pineapples growing on this soil until the plants are six months old. They further suggest that an application of manure at flowering might be of practical value.

It is, of course, well recognised that the chemical analysis of a crop is by no means a sufficient guide to the manurial needs of that crop and that the plants examined in this case enjoyed a luxury consumption of nutrients yet it is felt that, with this particular soil, the results obtained give indications regarding the quantity and quality of fertilisers which should form the basis of field experimentation.

The results in general suggest that the pineapple on this particular soil requires a mixture high in potash and low in nitrogen and phosphate. A preliminary survey experiment (para. 30, Report of Division 1933) indicated that the pineapples growing on the local plantation benefitted by a high potash—low phosphate application.

26. During the year a number of pineapples, grown at the plantation, have been submitted for examination. The mean analytical values obtained from 23 of these pineapples are compared with those obtained in an examination of the fruit from the pot experiment.

TABLE XIII.

	Brix.	pH.	% Acidity.	$\frac{\text{Brix}}{\text{acidity.}}$	% Ash.	% Phosphate.	% Potash.
Plantation fruit	12.25	4.19	0.50	23.08	0.388	0.020	0.13
Experiment fruit	16.52	3.84	1.00	16.52	0.644	0.028	0.29

It will be seen that the fruit receiving an adequate supply of plant nutrients not only contained larger amounts of mineral constituents but also possessed juice of higher brix and acidity and of a more favourable brix : acidity ratio. The results of the experiment suggest that the quality of the fruit is improved by adequate manuring.

Grapefruit.

27. Preliminary chemical examination of samples of leaves, fruit and soil from the grapefruit cultivation, Hosororo Experiment Station, was commenced during the year.

Collections of leaves which had just hardened were made from healthy and unhealthy grapefruit trees. The results of the laboratory examination of these samples are given in Table XIV. together with certain standard values quoted by Hardy and Rodriguez (*Trop. Agr.* XII. pp. 205-215).

TABLE XIV.
CHEMICAL COMPOSITION OF LEAF ASH OF GRAPEFRUIT.

	British Guiana.		Standard.	
	Healthy tree.	Unhealthy tree.	California.	Trinidad.
Ash % dry matter	...	10.48 (16.93)*	17.7	13.7
Nitrogen % Total Ash	...	33.0	38.8	19.4
Phosphate % Total Ash	...	3.2	3.9	3.9
Potash % Total Ash	...	20.2	2.1	10.4
Lime % Total Ash	...	47.8	7.2	42.7
N/P ₂ O ₅ ratio	...	10.2	48.4	5.0
N/K ₂ O ratio	...	1.6	6.4	1.9
K ₂ O/P ₂ O ₅ ratio	...	6.3	8.4	2.7
CaO/K ₂ O ratio	...	2.4	6.7	4.1

* Sulphated ash.

Comparing first the results obtained from the healthy and unhealthy trees it will be seen that the healthy tree contains more total ash and more lime than the unhealthy tree. The latter contains a very large amount of potash. There are considerable variations in the nutrient ratios which may best be considered in relation to the standard values.

It is apparent that the British Guiana leaves are low in ash content suggesting the need for fertiliser applications. The nitrogen content of the leaves is very high and may be due to previous dressings of nitrogenous manures† or possibly due to the fact that the soil, originally under bush, still possesses a high nitrogen status. The phosphate contents are not exceptionally high. The potash contents are very high due probably to the applications of potash manure on these lime-deficient soils. The lime content of the healthy tree compares favourably with the standard; that of the unhealthy tree is very low.

The nitrogen-phosphate ratio is very high in the British Guiana samples. The values for the important nitrogen-potash ratio are lower than the standard figures, that for the unhealthy tree being much lower than that for the healthy tree. The potash-phosphate values are high, the divergence being much greater for the unhealthy tree. The value for the lime-potash ratio is low in the healthy tree and very low in the case of the unhealthy tree.

The general conclusions reached are that the low values for total ash in the British Guiana trees suggest the need for fertiliser applications. The divergent

† The trees received during the previous year an application of $\frac{1}{2}$ lb. sulphate of potash, 2 lb. basic slag and 1 lb. sulphate of ammonia per tree.

values for the various nutrient ratios indicate that the balance of nutrients requires adjustment by correct manuring. A comparison of the values obtained from the healthy and unhealthy trees indicates the value of lime in grapefruit nutrition.

Soil Analyses.—Samples of soil supporting the healthy and unhealthy trees already discussed were examined in the laboratory with the following results.

TABLE XV.

	Good soil.	Poor soil.
pH normal ...	5.28	4.45
pH exchange ...	4.83	3.93
Total exchange capacity, mgm. eqs. /100 gms. ...	10.7	6.2
Exchangeable lime, mgm. eqs. /100 gms. ...	7.2	0.5
Percentage saturation ...	67	8
Readily Available phosphate ...	Trace	Trace
Nitrogen % ...	0.318	0.282

The lime status of the good soil is adequate and the percentage saturation with lime is close to the value—65 per cent.—adopted by Hardy in Trinidad. The poor soil is highly acidic and possesses a very unsatisfactory lime status. It is calculated that a dressing of 11 lb. of limestone applied within a ring of dimensions ten feet two and a half feet radii, with the tree trunk as centre, is required to produce a desirable lime status to this soil.

Fruit Analysis.—Two grapefruit from the Hosororo Experiment Station were examined in detail in the laboratory. The results appear in Table XVI and may be compared with those presented by Hardy and Rodriguez.

TABLE XVI.

	A.	B.
WHOLE FRUIT—		
Weight of fruit, gms. ...	521	505
Density, gms. per cc. ...	0.801	0.814
Rind and Albido, per cent. ...	26.5	26.2
Juice and pulp, per cent. ...	73.0	73.4
Total dr. matter, per cent. ...	17.3	15.1
Total ash, per cent.* ...	0.77	0.67
GRAPEFRUIT JUICE—		
Brix (Total Solids) ...	10.2	9.0
Degree of acidity (pH) ...	3.86	3.45
Total ash, per cent.* ...	0.31	0.30
Total Sugar, per cent. ...	7.84	6.38
Reducing sugars, per cent. ...	4.71	4.29
Citric acid, per cent. ...	1.30	1.27
Brix/acid ratio ...	7.8	7.1
Sugar-acid ratio ...	6.0	5.0
RIND ASH—		
Total ash, per dry matter* ...	5.2	5.4
Nitrogen, per cent. ash ...	11.1	14.3
Phosphate, per cent. ash ...	1.7	1.3
Potash, per cent. ash ...	20.3	29.2
Lime, per cent. ash ...	15.5	16.8
Ratio, nitrogen/phosphate... ..	6.5	11.0
Ratio, nitrogen/potash	0.4	0.5
Ratio, potash/phosphate	13.4	22.5
Ratio, potash/lime	1.7	1.7
JUICE ASH—		
Total ash, per cent. dry matter* ...	3.06	3.33
Nitrogen, per cent. ash ...	19.2	21.7
Phosphate, per cent. ash ...	3.5	4.0
Potash, per cent. ash ...	46.6	45.3
Lime, per cent. ash ...	5.3	4.0
Ratio, nitrogen/phosphate... ..	5.5	5.4
Ratio, nitrogen/potash	0.4	0.5
Ratio, potash/phosphate	13.3	11.3
Ratio, potash/lime	8.8	11.3

*Sulphated Ash.

The average density of the local fruit is rather low but the percentage of juice and pulp compares favourably with that from other countries. The contents of total sugars and of citric acid are fairly high. The sugar-acid ratio, generally considered to be an index of quality, indicates that the local fruit examined is of

a poorer quality than the Trinidad grapefruit but compares very favourably with that of Puerto Rico, Florida and Texas. The rind of local fruits contains slightly less nitrogen and potash than that of Trinidad fruits; it contains markedly less phosphate and lime. The same statements apply in a comparison of the juices. The phosphate content of the British Guiana grapefruit juices is very low.

The relative amounts of nutrients in the whole grapefruit reported from various countries are shown in Table XVII.

TABLE XVII.

		Nitrogen.	Phosphate.	Potash.	Lime.
Puerto Rico	...	2.0	1.0	3.3	—
Florida	..	2.2	1.0	4.7	—
Trinidad (lime-land fruit)	...	2.5	1.0	4.3	2.6
(acidic-land fruit)	...	3.5	1.0	5.2	2.6
British Guiana A	...	4.7	1.0	7.9	2.7
B	...	6.3	1.0	9.5	3.2

The values indicate the relatively low proportions of phosphate and of lime in British Guiana grapefruit.

It is apparent that there are areas of soil within the grapefruit cultivation at Hosororo Experiment Station which require applications of ground limestone while other areas apparently possess an adequate lime status. The nitrogen and potash contents of the leaves are high and the values for the nutrient ratios indicate the general unbalance of nutrient supplies. It is possible that applications of phosphatic manures might prove beneficial though the Trinidad work indicates that such applications have little effect on the nutrient ratios. Soil samples from good and bad areas besides showing the differences in lime status indicate the general lack of available phosphate. Analyses of the fruit show high contents of nitrogen and potash as compared with phosphate and lime.

It was suggested that the soil supporting unhealthy trees of the cultivation be dressed with ground limestone while certain of the healthy trees be given an application of superphosphate as a simple experiment.

Factory Work,

28. During an inspection of sugar factory returns Mr. J. F. Williams suggested that the sum of two numbers, the sucrose per cent. cane and the tons cane per ton sugar, should approximate to a constant in the neighbourhood of 21. An inspection of the data of the Colony's factories for the last six years indicated that, not only was this figure fairly constant for any one factory but that its value gave a very good indication of the factory efficiency.

The correlation between the mean overall recovery and the mean value for this figure for fifteen factories for six years is $r = -0.9797$ ($P = 0.01$) and the regression equation is $R = 212.86 - 6.05 K$ where R = the overall recovery and K = the value of the figure. A similar examination of the returns for eight Trinidad factories for the last two years gives a correlation coefficient of $r = -0.9685$ ($P = 0.01$) and a regression coefficient of $R = 222.80 - 6.348 K$. Apparently the same variation in recovery has a slightly smaller effect on the value of the constant in Trinidad than it has in British Guiana. The slopes of the two lines are however approximately similar.

The values for British Guiana indicate that there is a definite connection between the output of a factory and its efficiency. The correlation coefficient between output and the value of K is $r = -0.8213$ and the regression equation is $K = 23.274 - 0.1304 T$ where T is the annual output in thousands of tons of sugar. The equation suggests that only those factories turning out between thirteen and fourteen thousand tons of sugar per annum are really efficient.

Forage Crops.

29. During the period under review numerous samples of pasturage have been examined with regard to their mineral constituents. The results are given in Table XVIII.

TABLE XVIII.
PER CENT. OVEN DRY WEIGHT.

	I.	II.	III.	IV.
Total Ash (sulphated) ...	16.29	17.66	9.00	15.93
Silica-free ash ...	9.37	15.12	8.89	14.83
Silica ...	6.92	2.54	0.11	1.10
Sulphate (SO ₃) ...	0.99	1.34	0.02	0.43
Chloride (Cl) ...	2.05	2.18	2.66	2.27
Phosphate (P ₂ O ₅) ...	0.86	0.95	0.81	1.37
Nitrogen ...	2.07	2.29	3.01	3.45
Lime (CaO) ...	0.45	0.45	0.84	0.63
Magnesia (MgO) ...	0.98	1.00	1.07	1.41
Potash (K ₂ O) ...	4.34	4.13	3.49	5.15
Soda (Na ₂ O) ...	0.22	0.29	0.09	0.15
Iron oxide (Fe ₂ O ₃) ...	0.24	0.09	0.03	0.11
Alumina (Al ₂ O ₃) ...	1.65	1.59	0.32	0.91

- I. *Paspalum dilatatum*.
- II. *Paspalum virgatum*.
- III. *Indigofera endecaphylla*.
- IV. *Phaseolus calcaratus*.

The silica-free ash content of all four samples is high. Most of the fodder crops of the coastlands of British Guiana are somewhat deficient in phosphate and lime but the phosphate contents of these four samples are high and compare very favourably with that of British natural pasturage (0.67 per cent.). The lime contents of the two grasses are low. The two legumes are well supplied with lime. The potash and chloride contents of all samples are high.

In addition to these samples, six collections were made in the Rupununi District and Pakaraima Range by the Chemist. The results of their examination are to be found in the published report.

Fish Poisons.

30. During the latter part of the year samples of Black and White Haiari (*Lonchocarpus Nicou*) were examined in a preliminary fashion with regard to their content of rotenone and other insecticidal principles. The work is being continued.

Samples of roots of the Haiaris of this Colony which have from time to time been examined at Rothamsted Experiment Station have always contained much lower amounts of rotenone than those reported for the Peruvian Cubé (*L. Nicou*). It seems possible that the soils supporting the plants sampled did not furnish an environment suitable to the production of large amounts of rotenone. It has been noticed independently by Forestry Officers, Geological Surveyors and by the Chemist that bush ropes grow profusely upon the red soils overlying outcrops of basic rock. Some of these soils probably contain a fair amount of available lime. The Haiaris are legumes and are likely to thrive on soils possessing a fair quantity of lime. It is possible that Haiaris growing on limed soils may contain higher percentages of rotenone and in order to test this possibility plants are being grown in limed and unlimed plots, and tubs of sand saturated and unsaturated with respect to lime.

Scale for Rum Still.

31. During the year a sample of scale occurring on the topmost plates of the boiling column of a copper rum still was submitted for examination. The scale formed so rapidly that frequent stoppages were necessary. The sample consisted of a buff-coloured, compact crystalline mass about half an inch thick. Analysis indicated that it consisted of pure gypsum. It has been the practice in this factory to add lime to the first molasses during processing and it was

anticipated by the factory chemist that the substitution of sodium carbonate for lime at this point would reduce the amount of scale formed. Such a substitution did not have the desired effect and the causes for this deposit must be sought in other directions.

ACKNOWLEDGEMENTS.

32. It is a pleasure to record an appreciation of the work of the staff during the period under review.

R. R. FOLLETT SMITH,
Chemist.

March 31, 1936.

DEPARTMENT OF AGRICULTURE.

REPORT ON THE BOTANICAL AND MYCOLOGICAL DIVISION FOR
THE YEAR 1935.

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REPORT ON THE BOTANICAL AND MYCOLOGICAL DIVISION FOR THE YEAR, 1935.

STAFF.

E. B. Martyn, B.A., A.I.C.T.A.—Botanist & Mycologist.
N. Persaud —Laboratory Assistant.

DISEASES OF MAJOR CROPS.

Sugar Cane.

No serious disease of this crop was reported during the year. Two abnormal clumps of P. O. J. 2878 observed in a field of second ratoons on a Berbice estate were forwarded for examination. A considerable proliferation of buds had occurred at the base of the stool, giving rise to clumps of small grass-like leaves 1'-2' high. Such freaks are reported from time to time in other countries, and seem to be fairly common on Java canes.

Rice.

Sclerotium Disease.—A disease of rice attributable to the parasitism of *Sclerotium oryzae* Catt. occurred in the Northern Essequibo Islands. The disease was first reported in October, after being observed on the Department's seed farm at Wakenaam, where it affected "Blue Stick" padi alone in the variety trial plots. The disease was most prevalent along the line of old drains (the land having been under cane three years before). The symptoms resembled those associated with the attacks of the same fungus in other parts of the world. They included withering and stunting of the plants and the appearance of a lot of 'wind rice' (*i.e.*, empty grains). The appearance a few weeks earlier was reported to have been much worse, but after a dry spell there had been some rain prior to the time of inspection, and the infected plants had sent up a quantity of new tillers. It was also stated that a certain amount of withering had occurred in the seed-bed. The sclerotia of *S. oryzae* were found associated with this and all subsequent cases of the disease.

The affected plants first seen were from seed obtained from the Department's seed farm at Henrietta, Essequibo, but a neighbouring plot planted a little later with this same seed, was unaffected. At the same time, a similar, but much worse occurrence of the disease was reported from Leguan in an area that had also been sown with "Blue Stick" direct from the Henrietta seed farm. Another instance of the disease, again affecting "Blue Stick" from Henrietta seed, was reported from Aurora, Essequibo. In no case, however, was the disease reported on any other variety of rice, or on the progeny of "Blue Stick" seed obtained from plants grown on the islands. Observations made on "Blue Stick" from Wakenaam seed close to the Department's seed farm only revealed an occasional empty head here and there that might possibly be attributed to sclerotial disease. Finally, the disease has never been reported at Henrietta seed station itself.

Conditions of irrigation on the islands (and at Aurora, Essequibo) differ from those at Henrietta, and other slightly different environmental factors are also involved. It is possible that the "Blue Stick" variety, when subject to conditions as yet not defined, may be susceptible to a change of environment and requires a period of growth in a new locality to become acclimatised. Similar cases have been observed in Ceylon of padi from elsewhere, grown in a new environment, proving especially susceptible to *S. oryzae*.

S. oryzae has been reported in the Colony before, but as causing negligible damage. Recent work in India suggests that there, the fungus, though very prevalent, is not parasitic. In Ceylon, however, it has been shown to be a definite parasite under suitable circumstances, though there also the factors affecting immunity or susceptibility to attack are difficult to define.

An attempt was made to carry out inoculations in pots, though without success. It is, however, difficult to reproduce artificially the exact field conditions that bring about a disease so obviously dependent on environment. Inoculation of seedlings in test tubes gave positive results. Sclerotia were placed upon the stems of germinating seedlings, which were in due course attacked and killed by the fungus.

Associated with the diseased plants at Wakenaam, large numbers of sclerotia of *S. rolfsii* Sacc. were found, but as these were not observed in other instances, and as this fungus failed to parasitise rice seedlings, not only in pot cultures, but on agar slopes in test tubes, it was considered to be present merely as a saprophyte. The inoculation experiments were carried out, however, as this fungus was reported some years ago as causing a disease of rice in Louisiana.

Disease of Flowering Heads.—A similar disease of flowering heads of rice to that described in the report for 1932, the main symptom of which was a brown discoloration of the paleæ, was again observed in several instances, being especially noticeable on plots of 'Demerara Creole' and 'No. 79' at Georgetown Experiment Station which flowered during the wet season. *Acrothecium lunatum* was again found associated with the disease, and inoculation of flowering heads of 'Demerara Creole' with this fungus, a damp atmosphere being maintained by covering the plants with cheese cloth on a frame, resulted in a reproduction of the symptoms, the fungus subsequently being re-isolated.

Blast.—*Piricularia oryzae* occurred on 'Blue Stick' padi on the Essequibo Coast, at Wakenaam, and on the West Coast, Demerara, at the end of the wet season. 'Blue Stick' is especially susceptible to this disease, which is seldom reported on other varieties, but the damage done is slight and the disease usually passes off as the weather becomes drier.

Coffee.

The usual scattered occurrences of *Sclerotium coffeicolum* and Phloem necrosis were noted in the North West District.

Coconuts.

Wilt.—A number of cases of Wilt were reported from farms near the mouth of the Pomeroon River.

DISEASES OF MINOR CROPS.

Citrus.

Scab.—Owing to the persistence of 'scab' at Hosororo, the citrus nursery was temporarily abandoned and all plants in it dug up and destroyed in an endeavour to get rid of the disease.

Plantains and Bananas.

Moko Disease was found affecting Gros Michel bananas and plantains on a farm on the No. 2 Canal, West Bank, Demerara River and was found on Gros Michel at Pln. Dunoon, Demerara.

Cercospora Leaf Spot.—The leaf spot caused by *Cercospora musae* which has only recently been recorded in the Western Tropics, but has lately caused considerable damage to banana cultivations in Surinam, was observed on Gros Michel bananas on the East and West Banks of the Demerara River and on the East Bank of the Berbice River during the course of tours of banana growing areas made with Dr. V. C. Dunlap of the United Fruit Company, who re-visited the Colony during August. The disease had been noticed previously, but not regarded as serious, and its occurrence now is only sporadic. Owing, however, to its serious consequences in Surinam, it will be kept under observation in future.

Helminthosporium Black Spot due to *H. torulosum*, was also observed on Gros Michel bananas at Macaw, East Bank, Berbice River. The damage was negligible, but its occurrence may be placed on record.

Mottling.—It may also be recorded that the Mottling or Speckling of banana leaves noted by Wardlaw as of common occurrence in Trinidad, and with which a number of fungi were associated, has been observed in many instances in this Colony.

Cacao.

Pink Disease—(*Corticium salmanicolor*)—occurred to a small extent on a cacao farm at Arakaka, North West District. The trees were very closely planted, and the disease occurred in August during wet weather. Affected branches were removed and destroyed and when the same farm was visited in November, the disease had disappeared.

Tobacco.

Frog-Eye—(*Cercospora nicotianae*)—was observed spotting leaves of a coarse tobacco grown by the Indians and under cultivation on a farm at Arakaka, North West District. It was interesting to note that in this case the disease was worst on those patches where the bush had not been properly burnt before planting and where wood ash was less prevalent in the soil.

A similar spot has been observed on tobacco leaves from other parts of the Colony.

Grapes.

Shrivelling.—Some fruit was sent for examination from the West Bank, Demerara River, which was shrivelled and dried up. No parasite was discovered, but as the affected bunches were exposed to the sun and the shrivelling occurred during dry weather, it was probably due to an excessive loss of water.

Egg-plant.

Wilt.—A few plants of a variety producing rather small, round fruits, and grown at Agricola, East Bank, Demerara River, were affected by a Wilt Disease. The causal organism was not ascertained.

Cannas.

Rust—(*Puccinia cannae*) was observed on the leaves of several of the varieties growing in the Botanic Gardens.

Mustard.

White Blister (*Cystopus candidus*) was observed on some plants in a garden in Georgetown.

ACKNOWLEDGEMENTS.

Imperial Mycological Institute.

Thanks are again due to the Institute for assistance in determination of specimens and for advice given on matters referred to them.

FISH POISONS.

The White Haiari under cultivation in the open at Wauna Sub-station, North West District, flowered and fruited in April. Specimens were forwarded to Kew and there identified as *Lonchocarpus Nicou* (Aubl.) DC. Seed obtained from the fruits germinated readily, and a few seedlings have been raised at the Botanic Gardens.

Analyses are to be carried out to discover the poison content of this Haiari and compare it with the conspecific varieties found in other parts of South America.

Considerable interest in the Haiaris has been shown from many sources. Two visits have been paid to the Colony by agents of firms concerned with their commercial possibilities and a number of requests for planting material have also been received.

CASSAVA VARIETIES.

An attempt was made to classify some 26 varieties of cassava which were grown at the Georgetown Experiment Station. The majority of these came from the East Coast, Demerara, and it was apparent that in several cases the same variety was being grown under two or more local names. Comparison was made of the stems and leaf petioles of the plants and three main classes were distinguished according to the degree of pigmentation of the young stems and petioles. The varieties were then grouped, taking other factors into consideration, such as the colour of the bark, etc., and those that appear to be similar have now been planted together for further comparison, as a result of which, it should be possible to eliminate a number of redundant names. In addition, the names and descriptions of the varieties at the Experiment Station have been sent to the Agricultural Officers in other parts of the Colony, with the ultimate object of obtaining a complete collection of the varieties under cultivation, and also a list of synonyms used throughout the Colony.

JENMAN HERBARIUM.

The remounting and indexing of specimens has been continued, together with the general routine work of the Herbarium, which has included the collection and despatch of a large assortment of seed in response to numerous requests.

The remaining unnamed and partially named sheets in the Herbarium, some 300 in all, were sent to Kew, and also approximately 200 sheets of specimens collected in the previous year by Dr. W. A. Archer in the North West District and near the Forestry Station. All of this material was named, the majority by Mr. Sandwith, and we are much indebted for the prompt determination of these and of some other specimens sent during the year.

An album of Jamaica Ferns that had been in the Herbarium for many years was presented to Kew, and also some 1,500 sheets of specimens from countries outside the Colony, principally from Brazil, which served no very useful purpose in this Herbarium.

50 sheets of Verbenaceae were sent to Kew for examination by Dr. Moldenke in the course of his monographic studies on this family. Some 17 duplicate specimens of vascular cryptogams were presented to the British Museum, and we are indebted to Mr. Alston of that Institution for naming a number of cryptogams for us.

NORTH WEST DISTRICT.

Two visits were paid to the district during the year, their main object being the inspection of the Experiment Station at Hosororo and the Sub-station at Wauna. During the absence of the Deputy Director on leave, the Government Botanist assumed charge of these stations. In the course of the second tour of the district a visit was paid to Arakaka in the company of the District Commissioner.

E. B. MARTYN,
Botanist and Mycologist.

February 15, 1936.

DEPARTMENT OF AGRICULTURE.

REPORT ON THE BOTANIC GARDENS FOR THE YEAR 1935.

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REPORT ON THE BOTANIC GARDENS FOR THE YEAR 1935.

STAFF.

E. B. Martyn, B.A., A.I.C.T.A.	—Superintendent, Botanic Gardens.
H. A. Cole	—Agricultural Instructor.
P. O. Jackson	—Probationer.
M. Sheriff	—Nursery Foreman.

GENERAL.

The weather throughout the year was on the whole favourable from the gardener's stand-point, the rainfall being well distributed. Except for the continuation of rather heavy rain to the end of August, the rainfall month by month and the succession of the wet and dry seasons was entirely normal.

The renewal of the Gardens Buildings, which has been gradually carried out during the past four years, was completed with the pulling down of the old stable and the construction of a new and smaller building to house the donkeys and the carts. A vat was built in the nursery for the use of the Gardens' staff. A small shed was constructed to serve as a gasolene store for the motor mower and another to house the mower itself.

The following table shows the amounts spent under the votes accorded to the Gardens :—

	Vote.	Expenditure.
Botanic Gardens—Maintenance ...	\$ 5,000	\$ 4,998 84
Purchase, Production and Distribution of seeds and plants ...	3,700	3,681 11
Upkeep of Government Gardens and Grounds ...	1,400	1,392 99

FRONT GARDEN.

Beds and Borders, etc.

The display of flowers in the beds and borders was maintained throughout the year, the results obtained varying as usual with the seasons and with the assortment of seedlings available. The Gardens presented their best appearance in March and early April, when a large number of plants were in flower and the avenue parapets were especially good. Some varieties of *Zinnia elegans* from Trinidad and a section of mixed shades of *Portulaccas* were particularly successful, and later in the year some good displays of colour were obtained in beds where *Cannas*, *Zinnias*, *Portulaccas*, etc., were grouped together. A tall species of *Celosia* was also among the successful new introductions.

As regards shrubs and trees, innovations included the planting of a row of different varieties of *Hibiscus* as 'standards' on either side of the path south of No. 2 Lake, and the massing of Lilac and Mauve shades of King of Flowers in the circular bed in the south section of the Gardens. King of Flowers also were planted opposite the office, by the entrance gates, to replace the *Adhatoda* sp. which had never been very successful there, and which was put elsewhere. *Clerodendron ugandense*, recently introduced from Trinidad, has proved a success, and appears now in several beds, and *Buddleia variabilis* has been reintroduced to the Gardens. The white variety of *Poinsettia* obtained from Trinidad last year was planted out, and several new species of *Bauhinia* have been set out around the No. 2 Lake. Pink and White varieties of *Barleria cristata* have been introduced from Trinidad. The Bougainvilleas 'Lady Wilson' and 'Helen McLean' were trained over an arch at the entrance to the Chemistry Laboratory. Another variety of

Bougainvillea spectabilis, of a lighter pink than that now cultivated in the Gardens, was found climbing on a tree in the Lamaha border, where it must have been overlooked for many years. One of the Double Coconuts planted near the No. 2 Lake sent up its first leaf during the year.

An increasing area of the lawns is now cut by machine, the motor mower improving their appearance considerably. To facilitate its use a number of depressions were filled in, and also some of the smaller open drains. The paths around the bandstand and near the Aviary were sheeted with burnt earth, and posts have been placed preventing the access of cars to any of the paths north of the avenue. The edges of many of the lawns have become badly worn by repeated cutting and weeding, and are being built up again with fresh earth.

New plantings in the Front Gardens during the year included :—

<i>Acacia auriculaeformis</i>	<i>Cassia Sophera</i>
<i>A. jarnesiana</i>	<i>Cordia sebestena</i>
<i>Barkleya syringifolia</i> (died later)	<i>Dillenia indica</i>
<i>Bassia latifolia</i>	<i>Glyricidia Maculata</i>
<i>Bauhinia acuminata</i>	<i>Hedychium coccineum</i>
<i>B. Kurzii</i>	<i>Ixora sp. (Hybrid)</i>
<i>B. tomentosa</i>	<i>Macadamia ternifolia</i>
<i>B. violacea</i>	<i>Melaleuca armillaris</i>
<i>B. sp. (pink)</i>	<i>Phlebotaenia Cowellii</i>
<i>Brachychiton acerifolia</i>	<i>Platymiscium polystachium</i>
<i>Caesalpinia Sappan</i>	<i>Poinsettia pulcherrima var. alba.</i>

and the Palms :—

<i>Arenga mindorensis</i>	<i>Sabal Yapa</i>
<i>Actinorhytis calapparia</i>	<i>Scheelia gomphocoece</i>
<i>Butia capitata</i>	<i>Thrinax radiata</i>
<i>B. Yatai</i>	<i>Trachycarpus excelsa</i>
<i>Gaussia princeps</i>	<i>Washingtonia robusta.</i>
<i>Orbignya Dammeriana</i>	

Lakes, Aviaries, etc.

The 'paaling' of the edges of the lakes with wood to prevent the damage done by the Manatees was continued and a barrier was put up between No. 1 and 2 Lake, so that these creatures can be kept for the greater part of the time in No. 1 lake, where they do less damage. They are given access to the other lakes, etc., periodically in order to keep them clean of weeds. The iron bridges were repainted during the year, and the bridge west of No. 1 Island was repaired.

The Aviary was moved during the year to a better site behind the bandstand, where it does not interrupt the view from the avenue across the gardens. A row of *Glyricidia maculata* trees were planted to the west of it to give shade, and two groups of *Casuarina* plants inside, for the same purpose. Whilst a few birds died during the year, a number of additions were made to the collection.

PARK LANDS.

The Park Lands have been maintained in order during the year, largely with the assistance of prison labour. It is regrettable that lack of funds make it impossible to develop the possibilities offered by this large area of the Gardens.

Two heaps of earth were burnt during the year, the first, in the south section, where the pink *Nymphaea* pond was widened to obtain earth, being used chiefly to cover the area in front of the Head Office Garage. The second heap was burnt to the west of the Apiary, and to obtain earth a new trench was opened and subsequently planted with the true Pink Lotus Lily, *Nelumbo nucifera* obtained from Berbice. The Pink Lotus at present growing in the other trenches and lakes

is a rather pale shade, and is the result of hybridisation between *N. nucifera* and *N. luteum*, which latter was introduced into the Gardens in 1895 and has subsequently been entirely lost by crossing with the other species. It is hoped to re-introduced it.

The sources in the Gardens of the necessary supplies of wood for burning earth are becoming scarcer every year. This year a number of old trees of *Pithecolobium filicifolium* were cut out on the serpentine roads for this purpose and new seedlings planted to replace them.

New plantings in the Avenue and Park Lands during the year included :— *Butia australis*, *Callistemon acuminatus* *C. lanceolatus*; *C. linearis*, *C. pachyphyllus*, *Brachychiton acerifolia*, *Melaleuca hypericifolia*, and also *Sesbania grandiflora* and *Socratea exorrhiza* (the Boba Palm), which two latter, however, both died subsequently. The Frangipani plants which had bordered the Pink Nymphaea pond were removed and set out on the avenue—their place being taken by *Calliandra Guildingii*.

HEAD OFFICE GROUNDS.

Considerable progress was made with the laying out of these grounds. A great deal of earth was spread on the low-lying places and the whole lawn levelled and kept cut and rolled with the motor mower. A group of Hackia trees (*Tabebuia* sp.) was planted at the south east corner, a group of Queen of Flowers at the north west corner, a plant of *Ficus Benjamina* and *Melaleuca Leucadendron* on the lawn near New Garden Street, and a Flamboyante on the north east lawn. The Hibiscus hedge was continued round the whole area and to the west of the garage, and plants of 'Terra Cotta' Hibiscus and red King of Flowers, trained as 'standards,' were set out in front of the office. Bougainvillea was planted to hide the cycle shed which was added to the east end of the garage, and also at the foot of the electric and telephone standards on the lawn. The Saman trees along the Vlissengen Road and Regent Street were pruned, and Demerara Primrose (*Asystasia gangetica*) planted along the edge of the Vlissengen Road trench, outside the hedge. The roof of the garage was extended to shade cars within from the afternoon sun, and the area in front of it made up with marl and sheeted with burnt earth. At the end of the year the King of Flowers was removed from the bed in front of the office, and replaced by a circular frame on which *Allamanda Schottii* is to be trained. The Casuarina and Eucalyptus trees at the back of the buildings and the Acalyphas planted last year, made good growth, and in addition a hedge of Croton and Acalyphas was planted round the vat and incinerator to hide them.

NURSERIES.

Ornamental Section.

Pergola and Director's Lawn.—A pergola was constructed along the north side of the Director's lawn, the Pink Bougainvillea bordering the vegetable garden being trained over from one side, and the creepers on the Director's fence from the other, a grass path running down the centre. New plantings along the fence included *Bignonia renusta*, *Cryptostegia grandiflora*, *Ipomoea alata*, and an *Ipomoea* with large yellow flowers. The *Chalychlamys riparia* at the East end of the fence flowered several times during the year. The bed on the Director's lawn had a good display of Dablias and Hollyhocks early in the year, and other mixed herbaceous plants later on. A border of *Barleria cristata* (var. *rosea*) was planted round the east and south lawn. The Hibiscus hedge round the house was badly damaged during rebuilding operations and had to be cut back to ground level and supplied in places. Two red Bougainvilleas were planted to form an arch over the Director's entrance.

A very good collection of Dahlias was grown in pots, the plants when in flower being placed on the steps of Head Office. Morning Glory and other creepers were also grown in pots and trained over a light frame, and these too made a good display at the office. *Houckenia ficifolia*, obtained from Trinidad, with bronze coloured leaves, was grown in the bed outside the Glass House. It took several months to come into flower after bedding out, but was very effective when it did so, even though the flowers close in the middle of the day.

In the glass house the concrete shelves of the fern section were covered with a layer of shell, which proved beneficial, and the hanging ferns were treated with ammonium sulphate to stimulate their growth. They suffer inevitably, however, from periodic removal for decorative purposes elsewhere. A good selection of plants was sent to the Jubilee Agricultural Exhibition in the Promenade Gardens, and the services of the nursery staff were employed on several occasions when decorations were required.

Experiments.—An attempt was made to stimulate the Eucharist Lilies to more regular flowering by lifting the bulbs and storing them over a period of 2–6 weeks, but without any marked success. Experiments were also made with grafting some of the slower growing varieties of Hibiscus on the more vigorous types, but these also did not prove very successful. A plant of red Bougainvillea at the Promenade Gardens gave rise to one or two shoots with markedly variegated leaves, some lacking almost entirely in green. Efforts to propagate these freak forms were made, but neither ringings nor cuttings could be induced to root.

Introductions.—These included a number of varieties of Chrysanthemums from Canada, which, however, gave rather poor results, and several new lilies, including some Bermuda Lilies. These have all grown well, but have yet to flower. Two plants of *Phlebotaenia Cowellii*, the Violet Tree, were received from the Puerto Rico Department of Agriculture, and planted in the front garden. Seed of a number of ornamental trees and shrubs was obtained from the United States Department of Agriculture, and a selection of palm seed and plants, on an exchange basis, from David Barry & Co., of Los Angeles, and Coconut Grove Palmetum, Florida. Seed of various wild plants suitable for cultivation was also sent from time to time by Dr. Archer during his travels in Central America. An assortment of other seeds also was obtained from various sources, including Messrs. Vilmorin-Andrieux et cie of Paris, by exchange.

The rockery continued to be one of the best displays in the nursery. *Marica caerulea*, a few plants of which had been in the nursery for many years without flowering, produced a number of fine blooms during the year. It resembles the English Iris. The rose collection was found to be suffering from the large number of ringings required to fulfill numerous orders for plants. To better this situation, the price of plants of the majority of the roses has been raised, in the case of the best varieties to \$1.00 each. The rose beds near the Gardens' office were replanted towards the end of the year.

Orchids.—The collection was well maintained and there was a very fine display during April, when one or more plants of 21 species were flowering at the same time. In the course of the year one or more plants of 64 species were in flower.

Economic Section.

General.—The tables in the economic section which were in a very dilapidated condition were renewed. An old Ceara Rubber tree (*Manihot Glaziovii*) near the store fell and was removed. A Roble tree (*Platymiscium polystachium*) near the glass house died and was cut out, and another planted in its place. Two plants of Liberian Coffee were planted under the Almond trees as specimens for the benefit of visitors. An orchard was laid out at the end of the year at the east end of the Chemistry Laboratory Compound, where it is proposed to put a selection of local

fruit trees to serve as a source of seed and also to plant various foreign introductions that are received from time to time.

A selection of seeds, plants and propagating material was despatched to the various mining areas in the interior, an increase having been made on the Nursery vote for this purpose.

Citrus.—The remaining budded plants in the south section (No. 2) were lifted and the area remained under Bengal Beans until the end of the year. The stocks in the north section (No. 1) were budded as they became large enough, principally with budwood obtained from the Marsh grape fruit at Hosororo and from selected local seedling orange trees. Some buds of the variety Pink Marsh were obtained from Trinidad and a few plants raised, which will be sent to Hosororo. 2,375 stocks were budded during the year and 678 plants lifted. In addition assistance was rendered to several private nurseries in obtaining budwood and budding the stocks. The following table shows the distribution of budded citrus during the year :—

TABLE I.
DISTRIBUTION OF BUDDED GRAPE FRUIT AND ORANGE DURING 1935.

	East Coast.	West Coast.	West Bank.	Demerara River.	Berbice.	Essequibo.	Georgetown.	Total.
Budded Orange	50	3	1	1	43	11	18	127
Budded Grapefruit	6	...	58	1	37	6	7	115
	56	3	59	2	80	17	25	242

Mangoes.—A small crop was borne by the nursery trees in the middle of the year, and a good crop in December. Grafting was carried out as usual and 105 grafts taken off and basketed. The trees at the Experimental Station are now large enough to yield grafts, and this will help to increase the output in future, as the nursery trees are getting rather old and woody, despite periodic cutting back to induce new growth.

Indigofera endecaphylla which had proved a very successful cover crop at the Experimental Station was planted on one of the nursery mango beds, and appears to be more successful there in keeping down weeds than the *Dolichos Hosei* and Bonavist which it is to replace.

Pears.—Grafting of pears was successfully carried out and some plants were obtained from certain very good trees at the Royal Bank of Canada, the Sea view Hotel and one or two other gardens in Georgetown.

Cocoa.—A further number of seedlings were raised to fulfil orders, chiefly for farmers in the Pomeroon.

Introductions.—Amongst vegetables tried during the year 'Golden Tennis Ball' Lettuce, 'Globe' Beet and 'Early Gem' Carrot from Suttons were found especially suited to local conditions. Cuttings of five varieties of Pomegranate were obtained from Palestine, and the resulting plants will be put in the new orchard. A quantity of Nutmeg seed was obtained from St. Vincent to supply orders booked for plants. A few plants of Tonka Bean (*Dipteryx odorata*) were raised for trial in the Gardens, and seed of *Aleurites Montana* and *A. fordii* was obtained from Queensland and Honduras, the majority of the plants raised being sent to the North West District, whilst a few have been kept in the Gardens. Seed of *Aleurites Molluccana* was obtained from Coconut Grove. Another attempt to introduce Cinnamon was made, and seed obtained from Ceylon, but it failed to germinate. Two plants of *Achras sapota* were raised from seed obtained from the United States Department of Agriculture and are to be added to the collection in the orchard.

TABLES.

The following tables indicate the general activities of the Gardens during the year —

TABLE II.

Plants put out in the Gardens—On parapets	...	21,173
Shrubs, trees, etc.	...	270
„ basketed and potted —Ornamental	...	6,546
Economic (Except citrus)	...	7,783
„ ringed, layered and grafted	...	1,277
Seed sown —Ornamental (other than pkts.)	...	325
Economic („ „ citrus)	...	7,439
Citrus —Seed sown	...	12,000
Seedlings bedded out	...	2,171
„ budded	...	2,375
Plants basketed	...	678
Cuttings grown in propagator and beds	...	1,351

TABLE III.

PLANTS SOLD AND DISTRIBUTED DURING THE YEAR 1935.

Economic Section.				Ornamental Section.			
<i>Budded Grapefruit—</i>				Palms	...	...	339
Marsh ...	...	...	115	Ferns	...	...	165
<i>Budded Orange—</i>				Begonias	...	...	44
T. H. Late	...	...	33	Crotons	...	...	24
P. Brown	...	...	40	Hibiscus	...	...	9
P. Apple	...	...	26	Miscellaneous	...	...	575
L. G. Gong	...	...	21				
Satsuma	...	...	6	Total	...	...	1,156
Valencia	...	...	1				
<i>Grafted Mango—</i>				Bamboo bundles	...	...	138
Bombay	...	...	6				
Ceylon No. 1	...	...	14				
Colonial Bank	...	...	2				
Mrs. Date	...	...	13				
D'or	...	...	6				
Julie	...	...	70				
No. 11	...	...	10				
Grafted Pears	...	...	33				
Cacao	...	...	3,042				
Coffee	...	...	25				
Nutmeg	...	...	15				
Other Economics	...	...	1,101				
			4,579				

TABLE IV.

STATEMENT OF REVENUE RECEIVED FOR 1935 FROM BOTANIC GARDENS AND SALE OF GUIDE BOOKS.

Months.	Sale of Plants.	Hire of Plants.	Sale of Pots.	Sale of Bamboo.	Sale of Lilies.	Miscellaneous, delivery, cuttings.	Sale of Guide Books	Total.
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
January	32 00	9 84	1 60	2 88	1 26	40	4 54	52 52
February	34 90	1 44	...	48	32	...	7 16	44 30
March	28 06	9 60	...	99	06	16	3 36	42 23
April	21 63	...	1 40	1 20	1 00	22	4 32	29 77
May	21 46	...	...	1 88	4 45	05	72	28 57
June	35 46	48	...	43	2 06	21	13 20	51 89
July	40 52	...	...	1 09	1 70	24	5 28	48 83
August	23 95	40	30	24	2 23	28	4 80	32 20
September	15 56	...	...	72	1 35	62	6 96	25 21
October	19 86	...	3 44	1 50	1 96	90	2 88	30 54
November	17 73	1 28	...	2 04	1 35	24	3 84	26 48
December	22 88	1 12	...	2 12	1 22	1 36	48	31 18
Total	314 01	24 16	6 74	16 62	19 96	4 69	57 54	443 72

APPRENTICES.

There were seven apprentices employed during the year who underwent the usual courses of instruction in the various sections of the Gardens and Experimental Stations. One boy was sent to Hosororo Experimental Station for a fortnight to gain further experience.

GOVERNMENT HOUSE AND PUBLIC BUILDINGS.

The Public Buildings' Gardens were maintained in order during the year, one man being employed there permanently, as usual.

Government House Gardens, under the direction of the Governor and Lady Northcote, underwent a number of changes which have improved their appearance considerably. A trellis for climbing plants was constructed beside the north tennis court, the old arbour was renewed with as little disturbance to the plants on it as possible, and between the two a small rose garden was laid out. Four semicircular beds were made around the Frangipani tree, at a little distance from it, to replace the old circular bed around the base of it. A portion of the border between the house and the south tennis court was cleared of shrubs and trees and planted as a mixed herbaceous border. Another bed of this nature was laid out beside the vegetable garden, and a number of new climbers were trained on the fence of the latter. The parapets of herbaceous plants around the west side of the lawn were replaced by shrubs planted to the edge of the grass. Several new Canna beds were laid out, those on the lawn near the front door, planted with 'Uncle Sam,' being especially good.

A large number of tubs and pots were set out with flowering plants, and in these Browallia and Heliotrope proved very successful innovations, while some good Dahlias were obtained as well. A number of orchids were placed on the large mango tree on the front lawn and a Travellers' Palm and tall species of Heliconia planted near to it. The Bougainvillea and Petrea in the Carmichael Street border were trained over a framework in order to give further privacy to the front of the house. The fernery was removed to make room for the new herbaceous border at the back of the house, and re-erected beyond the vegetable garden.

ANTIDESMA.

An additional sum was voted for 'Plant Pests Preventive Measures' in order to eradicate the plants of *Antidesma Ghesaembilla* which covered large areas of the D'Urban Park Race Course, adjoining the Botanic Gardens. Destruction of this weed was carried out by spraying with 2 per cent. sodium arsenite, in accordance with the method successfully practised before in the Gardens themselves. (Ref. Agricultural Journal of British Guiana, Vol. III, page 84, 1930). The work was supervised throughout by the Herbarium Assistant. Spraying was begun in May, and by the end of the year the weed had been practically eradicated from the area concerned, only one or two further sprayings being necessary to kill out the last remnants of the plants, where there had formerly been pure stands of considerable extent.

E. B. MARTYN,
Superintendent,
Botanic Gardens.

February 18, 1936.

DEPARTMENT OF AGRICULTURE.

REPORT ON THE ENTOMOLOGICAL DIVISION FOR THE YEAR 1935.

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REPORT ON THE ENTOMOLOGICAL DIVISION FOR THE YEAR 1935.

STAFF.

F. A. Squire, B.Sc., A.I.C.T.A., F.R.E.S.—Entomologist.
C. Williams —Entomological Assistant.
W. V. Armoogan —Laboratory Assistant.

GENERAL.

Probably the most potent factor operating on the incidence of injurious insects in British Guiana is rainfall. Other meteorological phenomena, temperature, wind, etc., vary but little during the course of the year and consequently have no perceptible effect on the insect fauna of the Colony or if they have it is negligible compared with that produced by rainfall. There are two wet seasons—a long mid-year, and a short one during December and January totalling from 80 to 120 inches with a yearly average taken over the past 50 years of 88.23 inches at Georgetown. More important, however, than the total rainfall is its distribution. Thus, as pointed out in previous reports heavy precipitations at certain times result in the destruction of some of the soil fauna. The grubs of the Dynastids *Dyscinetus geminatus* and *D. bidentatus* in particular take the knock so badly that these species are kept in check for a long time afterwards. Convincing proof of this is to be seen in the innumerable dead grubs strewn over the grass lands after such a down-pour. The cane aphid, *Sipha flava* Forbes, on the other hand is abetted by moderate or even heavy rains spread over a period of several weeks. Such weather occurs some years during the long wet seasons and less frequently in the short one and invariably produces outbreaks of this pest. The precise effect seems to be two-fold: absence of sunlight, rendering the plant more susceptible to attack—strong sunlight returning quickly dissipates the pest, and secondly the suppression of predators by unsuitably moist condition. *Colapsis hypochlora* requires several months of moderate (2—3 inches per month) but evenly distributed rain to develop in pestilent numbers. Such conditions are seldom realised in British Guiana as there invariably intervenes a short drought or a deluge either of which is fatal to the Chrysomelid. It is perhaps for this reason that this pest is so little known here though it is indigenous and its food plants plentiful. Salt finds that the same holds good of this pest in North Eastern Colombia though probably it can tolerate a wider range of rainfall there as our heavy soil bakes hard or becomes water logged according to dry or wet conditions very rapidly. The influence of rainfall must not be overrated, however, for in other cases other conditions play a more important part.

Other injurious insects such as cane and rice borers are able to thrive quite independently of rainfall by reason of their sheltered larval habitat. Still others like the coconut caterpillar, *Brassolis sophorae* L. evince a periodicity which if not independent of rainfall at least shews no striking correlation with it. Even more so is this the case with the padi bug, *Mormidea poecila*, Dall. which flashes out once every few years, destroys many acres of padi in the course of a generation or two and then disappears even more suddenly than it came. Insects such as coushi or parasol ants are but little put out by the moods of the elements and take a steady toll year in and year out.

During the year 1935 the rainfall (Botanic Gardens) was slightly below the average and remarkably well distributed a fact which was reflected in the outbreak of an unusual number of minor pests of truck crops and fruit trees. In addition there was a short lived outbreak of the cane aphid, *Sipha flava* Forbes on several estates during June. The rainfall for this month was well above the average and evenly distributed.

PRINCIPAL CROPS.

Sugar Cane.

Diatraea spp.—During the absence on leave of the Entomologist-in-Charge of the Sugar-cane Moth-borer Investigations from April to December, his duties were taken over by the Entomological Division of the Department of Agriculture. An account of the investigations carried out and the results obtained in connection with the amazon fly parasite *Metagonistylum minense* introduced in 1933 is given in three quarterly reports submitted to the Secretary of State during the period mentioned.

The Cane Aphis.—Slight outbreaks of this pest occurred on the East Coast, Demerara, during June but these were of short duration. Efforts to cultivate the aphis in the laboratory for experimental purposes were only partially successful. Potted plants were grown in shade as this factor has been found generally conducive to aphis attacks but owing apparently to other unfavourable factors the colonies which appeared from time to time soon died out. The predators of this species have been discussed in previous reports.

Hardbacks.—The Dynastids *Dyscinetus geminatus* and *D. bidentatus* were not reported from any of the estates during the year. Weather conditions having been just right for the multiplication of these subterranean beetles, their continued absence can only be ascribed to the enduring effects of the floods of January, 1934.

Rice and Padi.

Investigations in connection with the control of the padi moth, *Sitotroga cerealella* and the confused flour beetle *Tribolium castaneum* are being continued.

The question of padi stalk borers was investigated from March, 1935, to February, 1936. In order to ensure regular supply of plants of approximately the same age throughout this period small plots were planted out at monthly intervals starting in January. The figures obtained are not worth giving *in extenso* as they reveal nothing of startling significance. The following points, however, merit brief mention :—

Diatraea saccharalis was present in fractional percentages until January, 1936, when there was a sudden upward trend which incidentally was also observed in sugar cane. This was accompanied by a marked increase in its parasite *Spilocryptus diatraea*, Myers (*Mesostenoides*)—rising to an average of 50% parasitism during January. The only other parasite recorded was *Microdus diatraea*, Turn. which, however, occurred in very small numbers.

Scirpophaga albinella, Cram., the white stem borer was throughout the investigation more numerous than *Diatraea* and like the latter fluctuated upwards in January followed closely by its larval parasite *Hecabolus* sp. This Braconid was active throughout the period and is almost without doubt a significant check on its host. Its average incidence during January was about 20%. Of 1,800 stems examined in January 14% were bored by *Scirpophaga* and 2.8% by *Diatraea*. It will be seen thus that both these pests were very mild during the period under survey. *Diatraea* is known to be capable of causing a loss of 25% of crop while *Scirpophaga* at times inflicts even greater damage than this.

The padi bug *Mcrmidea poecila* Dall. was bred in captivity from egg masses received from Mr. H. W. B. Moore, of Pln. Albion in November, 1934. Attempts were made to separate the strains based on the colour of the nymphal abdomens with a view of obtaining pure lines for genetical studies. In the case of the red strain this has almost been achieved. The green strain is also approaching purity but there is a certain type appearing occasionally which has a green thorax and head as well. Attempt to breed these have been wholly unsuccessful as the bugs did not attain sexual maturity but were eventually destroyed by a lethal factor.

Further observations on the oviposition of this Pentatomid were made with an eye to seasonal fluctuation or periodicity but no such phenomena appeared—the deposition of eggs being regular and consistent throughout the year and nothing new can be added to the account of the oviposition of this species already published (Agricultural Journal of British Guiana, Dec., 1934).

A study of the hardness of rice was made in connection with the rice weevil *Calandra oryzae*, L. The results were published in the course of the year (Agricultural Journal of British Guiana, June—Sept., 1935).

Coconuts.

An outbreak of the coconut caterpillar *Brassolis sophorae* L. occurring towards the end of the year at Kitty, an investigation of the activities of its different parasites was undertaken. Results showed that the pupal parasites are slow in joining in the fray and are far excelled by the egg parasite *Telenomus nigrocoxalis*, Ash. which rapidly attains a high incidence. This question is treated at greater length in a separate publication (Agricultural Journal of British Guiana, March, 1936, Entomological Investigations).

Attempts to persuade small holders at Kitty to cut down and destroy the coconut caterpillar nests on their premises were quite fruitless owing to a belief prevalent among these people that it is the Government's duty to carry out these elementary control measures. It is to be hoped that the Plant Pests and Diseases Ordinance passed last year will banish this misconception.

Bananas and Plantains.

Localised outbreaks of the plantain beetle *Colaspis hypochlora* occurred on the East Coast and West Bank, Demerara. This insect attacks the leaves, flowers and fruit causing considerable loss. Long and careful but unsuccessful searches for the subterranean forms have been made. Attempts to breed the insect in captivity have been successful so far and several egg clusters have been obtained. A preliminary account of this pest has been published (Agricultural Journal of British Guiana, March, 1936).

MISCELLANEOUS.

The following miscellaneous entomological investigations were made ;—The guests of *Solenopsis*; the attraction and trapping of the flesh fly *Cochliomyia macellaria* by means of carbon bisulphide; reduction in fruiting of *Dolichos* caused by *Frankliniella insularis* and its control; the insect fauna of temporary rain water swamps; the pupal respiration of certain insects; the pupal diapause of *Papilio anchisiades*; the loss in pupal weight. It is hoped shortly to publish on several of these subjects. In addition many other insects were kept under observation on the look out for unusual phenomena.

Enquiries concerning entomological matters were received and advice and assistance given from time to time.

The Collection.

The usual routine work of the laboratory was carried on especially that in connection with the entomological collection. Two consignments of insects were sent off to the British Museum for identification and three lots of named specimens were received from that institution. These included many genera and species not previously recorded from British Guiana.

The Agricultural Exhibition.

An exhibit of the pests of the Colony and their control was prepared and in the absence of the Entomologist-in-Charge of the Sugar-cane Moth-borer Investigations an amazon fly exhibit was also got up for the exhibition.

Publications.

Rice Weevil control, Agricultural Journal of British Guiana, March, 1935.

Entomological Investigations, Agricultural Journal of British Guiana, June—September 1935.

Hints on Vegetable Culture (Entomological Section) Agricultural Journal of British Guiana, December 1935.

ACKNOWLEDGEMENT.

It is with great pleasure that I acknowledge the enthusiastic support of my assistants, Messrs. C. Williams and W. V. Armoogan during the year.

F. A. SQUIRE,
Entomologist.

January 31, 1936.

DEPARTMENT OF AGRICULTURE.

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REPORT ON THE VETERINARY DIVISION FOR THE YEAR 1935.

Major T. Bone, O.B.E., M.R.C.V.S.—Government Veterinary Surgeon.

GENERAL.

1. The Government Veterinary Surgeon returned *via* the Cattle Trail from the Rupununi with the Commissioner for Assyrian Settlement on January 18. Mr. H. A. Fraser, B.V.Sc. acted as Government Veterinary Surgeon and the Superintendent of Agriculture for East Demerara administered the Georgetown Breeding Station from February 28 to July 23 while the Government Veterinary Surgeon was on leave.

Routine visits were made to the Breeding Station and Police Stables and imported animals were inspected at the wharves.

GOVERNMENT BREEDING STATIONS.

2. *Distribution of Stock—*

Georgetown. —7 Holstein-Friesian bulls, 2 Guernsey bulls.
2 Holstein-Friesian cows, 2 heifer calves, 1 bull calf.
2 Creole heifers.
2 Boars, 5 Sows—Canadian Berkshire.
3 Pens Poultry, 4 Pens Ducks.
1 Jack Donkey.
Leguan. —1 Guernsey bull, 2 Pens Poultry.
Forest Station.—1 Holstein-Friesian bull.

One Holstein-Friesian bull was transferred to Georgetown from Berbice when its services were not required at the out-station, and one Holstein-Friesian bull died at Onderneeming.

3. Number of cows brought for service—335.

The record of the Guernsey bull at Leguan shows that from 110 cows served 102 calves—79 heifers and 23 bulls—were dropped.

It is to be regretted that most of the cow-owners ignored the advice given as to rearing and attempted to rear the calves on two pints or less of milk daily—the usual allowance given to Creole calves wherever milk is sold. Several calves died, many existed in a state of semi-starvation, and only a few were reared properly. There are several half-bred bulls working in the Georgetown area and in the districts. The pure bred bulls at the Forest Station and Onderneeming were used for the herds at these stations, neither of which are in charge of the Department of Agriculture.

4. *Importations.*—One trio of Rhode Island Reds and one trio of White Leghorns from England.

5. *Sales.*—*Pigs.*—63 young stock.

Poultry.—46 young stock and 3,490 eggs.

Ducks.—4 young stock and 403 eggs.

6. *Pigs.*—The increase in the number of pigs sold does not denote a greater interest in pig-keeping by farmers. There was great difficulty in disposing of young stock, and several had to be kept to an age when they would have realised the same price had they been sold for pork in the local market. Most pig-keepers

place no value on breed or pedigree but expect Government to sell pigs which will give an immediate profit if re-sold to butchers.

7. *Poultry*.—The poultry section is small, but is sufficient for the present demand for pure-bred birds.

8. *Donkey*.—There is no demand for the services of the Jack.

9. *Fodder Plants and Grasses*.—The cover crop *Indigofera endecaphylla*, grown by the Superintendent of Agriculture for East Demerara, has been fed to cattle and is readily eaten. This crop is very easily grown and can be cut on several occasions during a year.

A trial plot of Teosinte was ready for cutting for forage $7\frac{1}{2}$ weeks after sowing. This crop tillers well and so may find favour with farmers; it is a very useful one for keepers of dairy cows.

10. *Revenue*.—Sale of stock, eggs, stud and inspection fees gave a revenue of \$618.85.

ANIMAL HEALTH.

11. The only contagious disease reported during the year was strangles.

Control of Animal Diseases.—There are no livestock regulations.

ANIMAL HUSBANDRY.

12. Except for a few cow-owners in the Georgetown area who struggle in adverse circumstances to keep their animals in good condition, there is no change in the methods of animal husbandry and it is difficult to see how any change on a large scale can be made until such time as cow-keepers are willing and able to rent grazing land for their animals.

The majority of cattle owners keep animals as a minor side line and in many cases merely as a matter of custom. They are prepared to feed cows during their lactation period with cut grass and sometimes concentrates, but young stock and dry cows are left to fend for themselves on heavily overstocked grazing areas. The carrying capacity of all land near the city and the larger villages is taxed to the utmost to keep cattle merely in a state of semi-starvation.

During the past year there has been no long period of dry weather under which condition the heavily stocked areas are normally almost bare of pasture, but even in these favourable circumstances the condition of the cattle was far from good.

So long as cow-keepers can sell milk and the local markets accept semi-starved animals for slaughter the cattle-owners will continue to keep their animals in this manner, and land-owners will continue to agist as many cattle as possible without any consideration for the carrying capacity of their land.

IMPROVEMENT OF BREED.

13. It is to be regretted that the larger cattle owners did not take advantage of the loan granted for the purchase of pure bred animals in England. The estimates of cost received from exporters were no higher than the prices previously paid for a similar class of stock. The common idea is that the prices of the local markets do not warrant the expense of importing pure bred animals. So far as slaughter cattle are concerned the local market prices are low only when compared with prices paid in years past; they are not low when compared with the prices paid for the best slaughter cattle in Argentine and Brazil and it is with these prices and these quality cattle which the local breeders will have to compete if they wish to share in the Island markets or even the better quality local market. The list of meat products imported by the Colony during a year is evidence that there is a demand for better quality.

The improvement of dairy cattle is handicapped by the fact that the owners are mainly small cow-keepers who own no land. Even if they can afford to feed a reasonable ration of milk to calves of improved breed, after weaning they are faced with the further expense of feeding of the heifer until it reaches maturity—animals of this type cannot be placed on over-crowded grazing areas and so must be provided with cut grass which is difficult to obtain.

The fundamental difficulty in improving both beef and dairy stock is the period of small profits which must continue until there are a sufficient number of improved animals to take the place of the present poorer type. Breeders of beef cattle, however, are not placed at a great disadvantage in that they have ample pasture and with good management can obtain full value for their Creole stock.

An increase in the price of meat per pound or milk per pint cannot be expected ; but with improved breed both beef and dairy cattle-owners can expect earlier maturity, the rancher greater weight and the dairyman larger yields of milk. Most of the employees of sugar estates are cattle-owners and much progress could be made if the Estates co-operated with their employees in building up herds of dairy cattle. Many Estates allow their employees to use land not under cane as grazing areas. What is urgently required is that these acres should be divided into paddocks for the segregation of the different classes of cattle and that the number of animals on them be strictly limited to the carrying capacity of the land. Large milking sheds provided with a good water supply and means for the sterilization of utensils would be of great assistance towards the production of clean milk which could be sold wholesale. The provision of one or more bulls of improved dairy type would soon build up dairy herds profitable both to the Estates and their employees.

T. BONE,
Government Veterinary Surgeon.

January 31, 1936.

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